BREAK-IN

November/December 2011

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

Merry Christmas from the team at NZART

In this issue:

- Use of Ferrites and Filters to solve EMI problems; Part 1
- Trident® antenna problems
- Homebrewing an antenna rotator
- Simple stepper motor drive circuit
- Extending the life of Diamond® co-linear antennas
- Back again – Dayton 2011
- E51AAO – My holiday DXpedition
- Eastfest Sept 2011
- ZL Crossword No.14
- Annual index 2011

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BREAK-IN

Volume **84**
Number **6**
November/December 2011

*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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PAST ISSUES OF *BREAK-IN*
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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

This year has been both busy and memorable for the editorial team. Not surprising the Christchurch earthquakes caused problems for all of us; I guess Advertisng Manager Lorne ZL2AHB and I got off the lightest with relatively minor damage to our homes. However Associated Editor Grahame ZL3SJ's home was damaged and he lost water and power etc for a few days. Technical Editor Kelvin ZL3KB was the worst hit and has had to leave his Avondale home and move to a new QTH in the Belfast area. To compound our problems Wyatt & Wilson, our printers, also suffered considerable damage to their plant. Nevertheless there were only minor delays in the production of *Break-In*.

Another key event was the completion and analysis of the *Break-In* readership survey. This has provided us with valuable insights into what our readers like best and want in the future. It was gratifying that there was generally a high level of satisfaction with *Break-In* but also almost equal numbers who thought *Break-In* too technical (10%), or not-technical enough (9%); which all goes to show that "you can't please everyone all the time"!

A new development this year was a trial introduction of a limited number of colour pages. From the editorial point of view this has proved to be more difficult than anticipated to implement; basically this is because it places severe constraints on the layout and ordering of pages.

Finally I must thank our loyal columnists and regular contributors without whom there would be no *Break-In* magazine. My special thanks to Vanessa Tansey, our skilful typesetter, who puts it all together and our printers Wyatt & Wilson for their excellent work to produce our world-class magazine.

To conclude I and the *Break-In* team wish our readers and their families our sincere good wishes for the coming festive season and New Year.

John Walker ZL3IB, Editor

Next deadline for copy is
10 January 2012

New Zealand Association of Radio Transmitters INC

(Founder Member of the International Amateur Radio Union Region 3)

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From The President

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>

There have been two matters that have been in the pipeline; namely a membership drive and a *Call Book* for this year. Both are dependent on obtaining data from RSM that is accurate and useable. In order for a *Call Book* to be ready for delivery with the December issue of *Break-In* the *Call Book* editor needs this data by 7 November. Consequently, as the data from the SMART system hasn't been received by him in time, we will have to reluctantly cancel the *Call Book* for this year. Likewise for the membership drive. Accurate data is necessary so that we can compile a list of non-members who will be approached to join. As a result, the membership drive has also been called off. Both of these cancellations are regrettable, but are outside the control of your headquarters as well as your council.

I hope that you all have a really enjoyable Christmas with plenty of time to enjoy family and friends and that 2012 will be good to you and yours.

Roy Symon, ZL2KH
President, NZART (Inc)

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SPREAD THE AMATEUR RADIO STORY

New Zealand Amateur Radio Day 2012

This will be held on 10 March from 1000 to 1400 hours

Branches are encouraged to set up a station in a prominent area in their local community, and to make contact with other NZARD stations and home stations. Make sure you seek the appropriate permissions to establish a station, with the council or businesses as appropriate.

Media inclusion is to be encouraged. Be sure to have pamphlets at hand. Contact NZART HQ for pamphlets.

A good idea is to have some hams operating equipment, and other hams available to talk to public and explain what amateur radio is and our place in the community, and how easy it is to get an amateur licence. After the event follow up with anyone who showed interest, and assist them with gaining their amateur licence.

The purpose of NZARD is twofold. To expose our hobby to the community and to prospect for potential amateur operators.

Please take photos and write a short activity report, and submit to *Break-In* for publication.

Any questions please send to Warren ZL2AJ at <warren@zl2aj.com> or 021-649284.

BEST WISHES FROM HQ FOR 2012

Subscriptions 2012

As at November 2011, membership figures total are 1871. This is broken down as follows: 1593 transmitting, 85 family transmitting, 14 student, 31 overseas, 13 non-transmitting, 5 family non-transmitting, 9 life, 32 over 60 years membership, 67 complimentary (reciprocal overseas agreements), 14 branches, and 8 associations.

SMART

Again we see a number of issues appearing in SMART, mostly concerning silent keys. I have been advised by RSM that if a branch, member of a branch or family knows of a silent key, whose call-sign is no longer required by the family of the deceased, these can be removed from SMART. However proof of the deceased, such as a death notice is required, so this can be logged in the RSM database.

Call Book

As with most other years, the annual *Call Book* appears to be one of the most contentious issues NZART Council has to face. Council base their final decisions after a very intense consultative process. Whether to produce this annual publication or not, is based on a number of influences, many of which are usually outside of their control. The Privacy Act, copyright and erroneous data are major contributors to what can and can't be achieved. Radio Spectrum Management have vehemently advised NZART, that if publishing call-signs from their database, it is not to be amended or tampered with in any way, therefore it is imperative that what is published is what is supplied by them insofar as call-sign information.

Should Council decide to produce a 'Members Only' *Call Book*, this then could be seen as a breach of the Privacy Act, making public a fact of financial status of an amateur.

Council has considered numerous options and does not take lightly when having to restrict a service to members, therefore I urge you to spare a thought for those persons on Council when going to print in a negative way.

Finally … thank you

Lastly I would like to offer my sincere thanks to you all for your continued support and assistance.

Merry Christmas
Debby ZL2TDM

WANTED: copy for *Break-In*

My stock of articles etc for future issues is running low so I appeal to members to assist with material for publication. This could be short or long articles on any topic related to amateur radio and electronics, constructional articles, book reviews, equipment reviews, software reviews, branch activity reports, etc.

I should also like to receive articles on electronics related topics such as auto-electronics, home sound systems, workshop practice; in fact anything that hams might find of interest. Thanks and 73, *John R L Walker ZL3IB (Editor)*

Email <zl2tw@nzart.org.nz>

Use of Ferrites and Filters to solve EMI Problems. Part 2 of 2

by David Conn VE3KL

Introduction

Part I of this series presented the basic concepts of differential and common mode signals that can be present on transmission lines and wiring and discussed the sources of interference.

Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to <www.rac.ca/tca. Sept/Oct 2010>

This part concentrates on methods for suppressing unwanted common mode signals that travel on the outside of our coaxial cables and other transmission lines. Unwanted common mode signals can travel throughout your home forming very large loop antennas that can act as transmitters or receivers.

The method of suppressing these unwanted signals (see TCA Hotlink, 1) is very straightforward. There are two main techniques that we use:

- Place a large series impedance in an offending loop. This is where ferrite chokes are used. A series impedance added to a loop generally reduces the unwanted current except for special cases where a resonance occurs.
- Avoid allowing unwanted currents from flowing in large open loops throughout your home. For example, use good twisted pair transmission lines to feed loud speakers instead of the EMI prone open wire types if you have speaker problems. The use of power line filters helps in this area as does the use of a power bar that is placed close to your radio system where all of the equipment in connected. Equipment chassis should be bonded together with the use of heavy gauge copper braid.

The article's outline is as follows:

- Review of the basics.
- The performance of ferrite chokes used to solve interference problems.
- A description of an experimental test bed that I have constructed to demonstrate the actual performance of ferrite chokes and other ferrite components such a 4:1 Baluns.
- A list of guidelines for the solution of EMI problems for Hams.

The Basics

- Interference can be caused by your transmitting antenna. This is usually serious and can lock up computers, sound card systems and keyers. The transmitter can also interfere with telephones, audio equipment, alarm systems and other electronic systems. Use an antenna Balun to keep the RF signal out of the house.
- Interference can be caused by noise sources in your house that radiate and are picked up by your antenna or conducted directly into your receiver circuits. One example is trash that is produced by routers that can radiate or conduct current into your receiver. Another serious source of interference is noise that is conducted into the house directly from the power lines. I have not found a suitable solution for this problem. To test for this problem hold a battery powered short wave portable radio close to a light fixture. If you hear lots of noise in the Ham bands, you have a problem.
- A differential mode signal places a voltage between the conductors of the cable and current flowing on one conductor is balanced by the current flowing on the other conductor. Hence, the cable does not radiate unwanted signals that can be picked up by our imperfect equipment. This is the usual wanted mode of operation for transmission lines.
- A common mode signal on the other hand places equal voltages on the conductors. The voltages at the ends of the cable are different and a current can flow along the cable. Because of skin effect this current flows on the outside of a coaxial cable. Hence, this signal mode radiates and can cause interference with other equipment. Because of reciprocity, equipment with a common mode problem can also receive unwanted signals and be interfered by these signals.
- Unwanted current that flows on the outside of cables travels around a closed loop. This loop can include a very long path from a PC to the main circuit panel of your house and back through various paths to the PC. This very long path is a loop antenna that can receive or transmit unwanted signals. In my house, the path length is approximately 20 metres. As mentioned previously, a fundamental way to reduce currents in a loop is to add a large series impedance to the loop. To do this, we simply add a high series impedance, a ferrite choke, to the loop that is causing problems. Reducing the current also reduces unwanted radiation.
- Current can get on the outside of cables because of many effects: leaky cables, the pin 1 problem (see TCA Hotlink,4), poor shielding, poorly designed antenna Baluns and other circuit defined imperfections.
- Another way to reduce coupling to a loop is to replace poor cabling with a twisted pair cable and reduce interference with ferrite chokes. See K9YC's serial cable (TCA Hotlink,1). Telephone systems have been using unshielded twisted for years because of their good cross talk performance. Another example is the use of high quality, low cost CAT5/6 cables that are used for Ethernet applications.
- A ferrite choke is a coil of wire that is wound on a ferrite coil form. It can take the form of a round choke or a toroid. Both have their advantages and disadvantages. Round chokes are very low in cost while toroids are more expensive but offer more flexibility.

The use of ferrite chokes for noise suppression

The basic problem associated with designing an RF choke for your system is that you do not have a circuit model for the offending loops. This means that you simply have to try a simple solution and if necessary add more chokes in series to increase the impedance. This sounds like a difficult thing to accomplish but in fact it is quite simple. I had a problem with RF getting into audio ports of my lap top computer and the problem was quickly solved by adding a single clamp-on ferrite choke. If I increase the power of my rig at some time, I will probably have to revisit the problem.

The guide line that I use is to have a choke with at least 500 Ohms of series impedance. As you add higher impedance the cost and difficulty of fabricating the chokes increases so keep it simple at first. Some of the chokes presented in this article have impedances in the range of 5000 Ohms in the HF band. These can be used if the necessity arises.

Another practical problem that you will encounter is that of making chokes with existing cables where you have to get a toroid that is large enough to accept the cable connectors. I usually make new cables from CAT5 bundles and assemble the connectors after the choke has been made. See TCA Hotlink, 1 for more on this problem.

Material selection

There are two very good materials from Fair-Rite products (see TCA Hotlink, 3) that are suitable for RF chokes that are used between 1 and 150 MHz. These are # 43 and #31 mixes. Mix #31 is probably the best overall as it covers low frequencies better than mix #43. I use mix #43 for all of my applications since my interests are in 40 to 2 metre operation. Note that #31 mix is relatively new and is only supplied in limited shapes and sizes so you probably have to stick with mix #43 except for round chokes. Figure 1 shows three ferrite chokes that I have built. They all use Fair-Rite mix #43. One of these chokes is used with CAT5 cable that contains 4 twisted pair 100 Ohm transmission lines. This choke has 8 turns of the cable wound

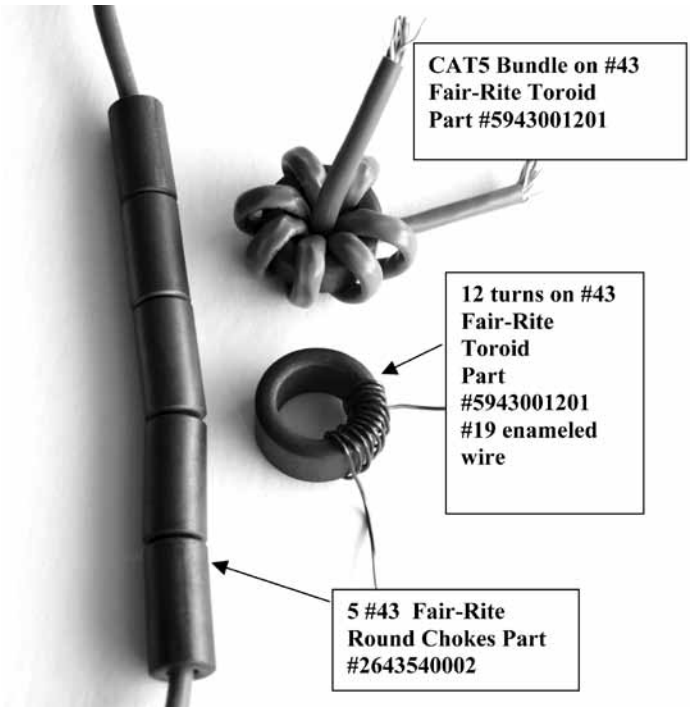


Figure 1. Photograph of EMI chokes used in this study. The round chokes and toroids were products from Fair-Rite® (part numbers 2643540002 and 5943001201.

on the toroid which has an outside diameter of 29 mm. Only one wire of the bundle was connected for these tests. If more turns are needed, a bigger toroid must be used. The 12 turn test choke shown in Figure 1 has very high impedance levels and can be used effectively with smaller cable bundles or very small diameter coaxial cable. The other choke in the diagram uses 5 Fair-Rite round chokes in tandem. This is the easiest type to use but has much poorer performance. The inside diameter is big enough to accept CAT5 or RG8-X coaxial cable. It makes a fairly good choke for 100W antennas. The next section shows the performance of the chokes shown in Figure 1.

CAT5 choke with 8 turns

The performance of the CAT5 choke is given in Figure 2. These are measured results using an AIM 4170 vector impedance analyser. The graph shows the magnitude and reactance of the series impedance in the frequency range from 1 to 51 MHz. Note the fall off at low frequencies where the magnitude of the impedance falls to 500 Ohms at 1MHz. Also note that the series reactance is positive (inductive) at low frequencies and negative at high frequencies (capacitive). The resonant frequency is approximately 16 MHz. This choke has a high series impedance of over 3000 Ohms near its resonant frequency and 1300 Ohms at 51 MHz.

12 turn choke

This choke, Figure 3, has similar impedance characteristics as the CAT5 8 turn choke. As expected, the impedance is approximately twice the value since its inductance varies as the square of the number of turns. Its resonant frequency is approximately 25 MHz where the impedance is greater than 8000 Ohms. Zmag is greater than 1000 Ohms from 1 to 50 MHz making it a very useful component.

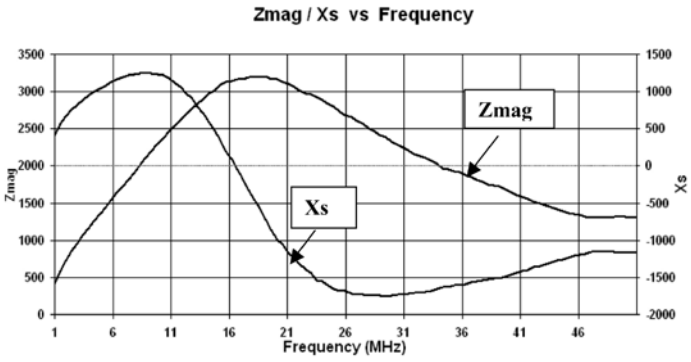


Figure 2. Performance of toroid using CAT5 Bundle (one wire connected). Zmag and Xs versus frequency.

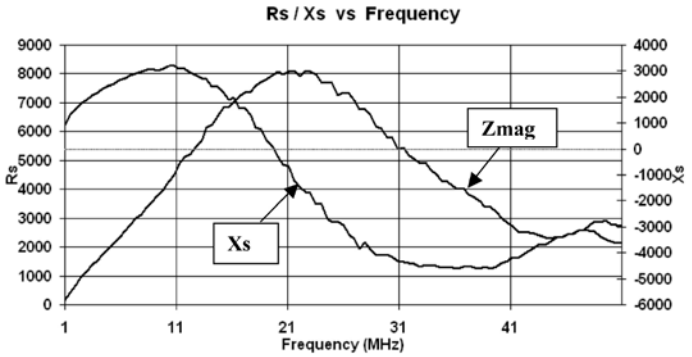


Figure 3. Performance of toroid (12 Turns). Zmag and Xs versus frequency.

Round choke

The round choke, Figure 4, has vastly different characteristics compared with either toroid. The maximum impedance is only 1100 Ohms at its resonant frequency of approximately 29 MHz. The good thing about this choke is that it is easy to make and use. I have chosen to use 5 round chokes to show that they work nicely as an antenna choke from 40 metres to 2 metres. It is really in its element in the 20 metre band. The impedance increases with the number of round chokes used which makes this choke a good choice for testing to see how many are needed in a given application.

An experimental test bed

An experimental test bed was fabricated to gain a better understanding of the complex process of dealing with differential and common mode signals which usually coexist in any experiment. The test bed also is extremely valuable for addressing the question of how much common mode impedance must be placed in an offending EMI loop to suppress the interference. The experimental test bed was also checked against LTSPICE, a well known circuit simulator. The test bed is also useful for checking a variety of ferrite transformers and other passive circuit elements.

The schematic diagram of the test bed is shown in Figure 5 and a photograph of it is given in Figure 6. It consists of four separate circuits. Each circuit contains a coaxial transmission and two local ground that can be shorted together or linked with any passive component, usually resistors. For this study, the two lines at the bottom of Figure 6 are used. The bottom line is a reference circuit. It contains two 25 Ohm resistors connected at the line output to local ground 1 as shown in Figure 5. This connection is for the special case of a balanced load fabricated with two equal resistors. The local grounds can be connected at the centre of the test. For this experiment I have shorted the grounds together to simulate a nearly worst case of common mode transmission line current.

Now, let's look at the results for the reference line which does not have ferrite chokes connected to the coaxial cable. Here, *Rc* is set to zero by connecting a short between the local grounds. Because the input

continued on page 6

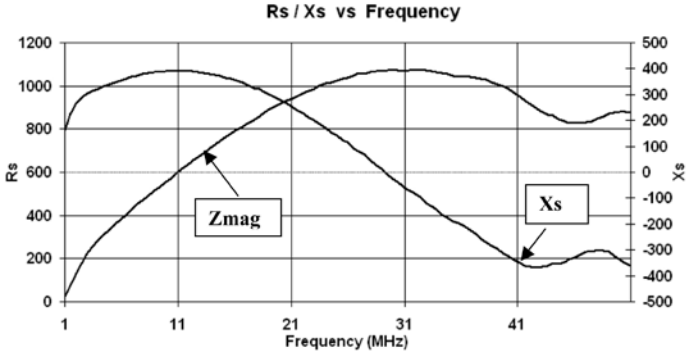


Figure 4. Performance of 5 round chokes. Zmag and Xs versus frequency.

continued from page 5

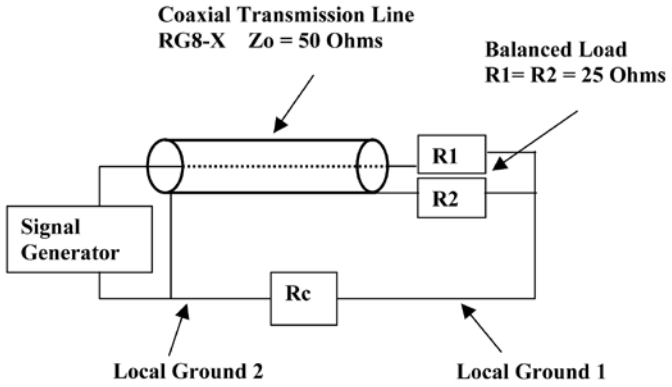


Figure 5. Circuit schematic of test bed.

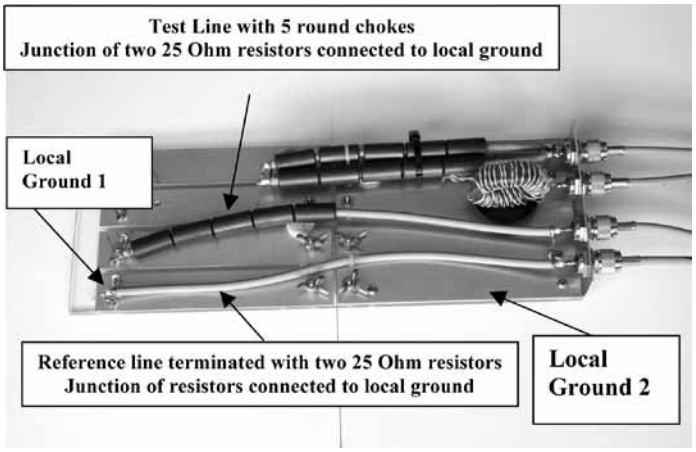

Test Line with 5 round chokes
Junction of two 25 Ohm resistors connected to local ground
Local Ground 1
Reference line terminated with two 25 Ohm resistors
Junction of resistors connected to local ground
Local Ground 2

Figure 6. Test bed photograph. Upper lines not used in this experiment. Lower line used as a reference. The line with ferrite chokes is used to test for common mode performance. Note that the local grounds are not connected in this photograph.

UHF connector connects its centre conductor to the centre wire of the cable ands its outer terminal to local ground 2, the DC input impedance will be equal to 25 Ohms since R2 is shorted out with this particular connection. Thus the SWR at low frequencies is expected to be 2:1. The measurements are shown in Figure 7 where the SWR is in fact 2:1 for low frequencies but gradually improves to 1.6:1 at higher frequencies (still not ideal). The SWR does not remain constant for two main reasons. First, the transmission line propagation starts to play a role at higher frequencies and second, the assumption that *Rc* = 0 is not valid at higher frequencies. Remember that in our real systems, we do not have control of *Rc* or even know much about its magnitude.

Now, consider the case where the measurement is performed with exactly the same connections except that five round chokes are used to make a common mode choke (see Figure 6). The measurements for this case are presented in Figure 8. Here the expected SWR = 1:1 if the choke is perfect. However, the measurements show that the SWR is very low up to 21 MHz and increases up to approximately 1.35:1 at 50 MHz. For the type of connectors that I am using, these are reasonable results. For example, a UHF connector has a reflection coefficient of approximately 0.05 at 50 MHz which corresponds to a maximum SWR of approximately 1.25:1 for two connectors. This can be improved considerably by the use of BNC connectors and associated hardware.

Guidelines

This section provides a set of rules (guidelines) that I recommend for setting up your Ham radio station. These are:

- Use a good Balun at the antenna terminals. The Balun should have a common mode impedance of at least 500 Ohms. For 100 Watt systems, I use five cylindrical sleeves as discussed in this article. Other types of Baluns will be needed for 1000 Watt systems.
- Use a good power line filter to feed a single power bar for your complete system. There are several commercially available common and differential mode filters that are very economical. I use a Tyco product (10VB1) for my system. It is rated at 10 Amps and has common mode rejection 45 dB at 10 MHz.
- Plug all of your equipment into a common power bar to keep EMI interference paths as short as possible. You do not want to create big unwanted antennas (transmitting and receiving) in your house.
- It is good practice to coil all of your power leads that get plugged into the power bar as this will add some common mode suppression and keep your radio shack nice and neat.
- Use common mode chokes that are fabricated from #43 material or equivalent where necessary (start with simple round ferrite chokes). Mix #31 is better but it is not readily available in many shapes at this time. I recommend that you start with very modest common mode impedances as low as 100 Ohms (far too small for big problems) and then increase the impedance by using suitable toroids. Clamp-on chokes are a good way to start but one clamp-on does not have a very high impedance so don't expect miracles from them. To identify and test for EMI problems see TCA Hotlink, 1 which contains a wealth of information on this subject.
- Use twisted pair cables to feed audio loud speakers if you have a problem with speakers thumping. Twisted pair cables in conjunction with common mode chokes are also very useful for connecting PC computer ports (sound cards) to your radio.
- Purchasing small quantities of ferrites is problematic. I recommend that you get together with members of your radio club to make fairly large purchases. The price varies dramatically as the quantities approach 100 units. Also, check around flea markets.
- Sometimes you will have to use capacitors to suppress differential mode interference. This is common for systems that are at the end-of-the-line where there cannot be any common mode currents. An example of this would be a smoke detector that is either powered from a battery or the power line. Make sure to use high quality ceramic capacitors with the

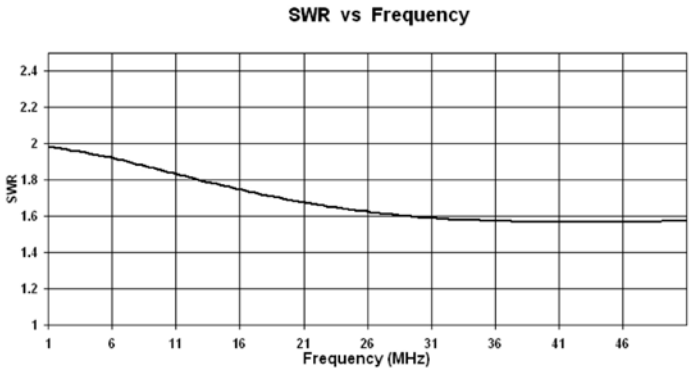


Figure 7. Reference Line SWR versus frequency. Expected SWR = 2:1 at low frequencies.

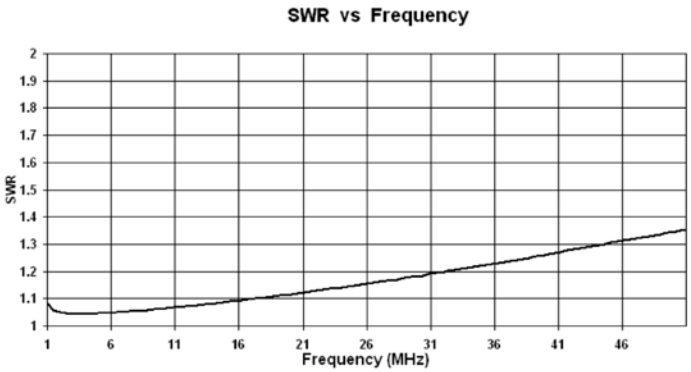


Figure 8. Measured Line SWR versus frequency. Expected SWR = 1:1 at low frequencies.

Trident® Antenna problem

by Ric Coleman. ZL2RIC

I recently purchased a new Trident® Antenna. Having owned an old faithful Trident for many years, I was assured to buy New Zealand made, and I did so again. My first drive into the carport and it broke; snapped off!

The base of the antenna is a weak point. There is a loading coil at the base, with a 10mm fibreglass rod fitted into it to form the top of the base section of the antenna. There is a 6mm hole drilled through it to fit the top jumper link banana plug socket so; whammo; an instant break point, held together with heatshrink. This is New Zealand made?

I devised the following solution. Get about 100 mm of 13mm OD, 10mm ID PVC tubing. Now, my dimensions are not critical, but should give you the right idea. With the broken Trident, remove the heatshrink from half the base coil and about 8–10cm up the fibreglass rod. Unsolder the joints at the top banana plug socket and unscrew the socket with small pointed pliers. It is a screw in unit. Don't lose it!

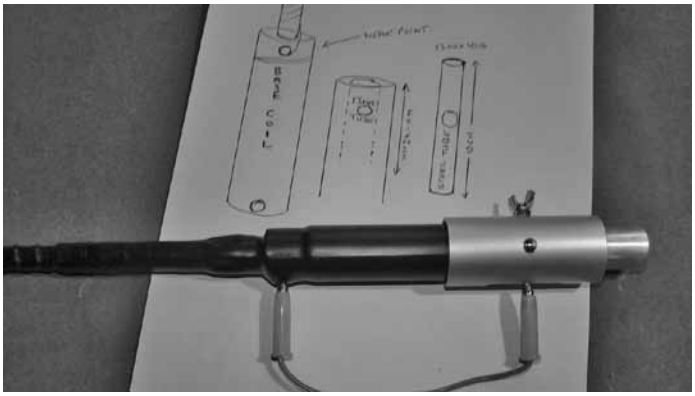
Next, remove what is left of the bottom of the fibreglass rod from the base coil. It doesn't appear to be glued so I drilled in to it, put in PK screw and it pulled it out. Now take your bit of 13 mm PVC tubing, drill an 8mm hole in the side of it, approx 40mm from one end. This is to coincide with the hole for the banana plug socket when you refit it. Next drill a 13mm hole about 42 mm down into the top of the base coil. (I covered/held everything together with masking tape while I was doing all this).

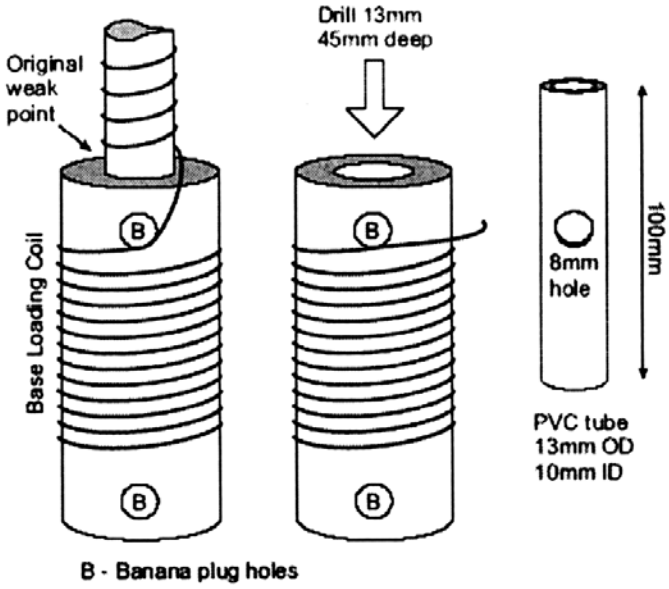
Use Araldite™, (not 5 minute stuff) to glue the PVC tube into the base section and align the hole so as to re-fit the banana plug socket without shorting it out with anything when re-soldering the connections to the antenna. A bit of sanding may be required to the bottom of the fibreglass rod, to get it to fit (and be Araldited) into the top tube of the base unit.

Now, you choose; "bodge or top job". You can cover the PVC tubing (bare 40mm) with electrical tape or heat-shrink tubing. Next, re-wind the bottom few turns over it, and solder everything together. Then 25mm and 12mm heatshrink finished off the job nicely. A pin hole for the top banana plug, and yes, it did get good results with the MFJ-259 tuner and it can stand the carport knocks. I hope photos help; not to scale, but you'll get the idea.

I hope this maybe of help to other Trident buyer/users.

Any questions to <zl2ric@gmx.com>. βi





NEWS FLASH!

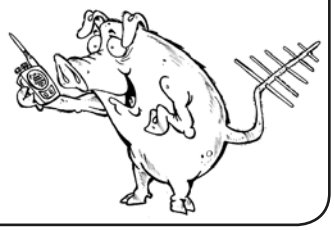
NZART CONFERENCE 2012 IN SUNNY NELSON

Queen's Birthday weekend (1-4 June 2012)

Tahuna Beach Conference Centre, Nelson

Onsite accommodation at Tahuna Beach Holiday Park

Freephone 0800 500-501



proper break-down voltage that can account power line surges up to approximately 600 Volts.

Conclusions

EMI is becoming an increasing problem for Hams as our equipment gets more and more sensitive. Part I and II of this series presented the basics of these problems, described an experiment to demonstrate common mode currents and ended up with a set of guidelines that can be followed that will help you solve EMI problems. These articles did not discuss the problems associated with safety or lightning protection which are also issues of major concern to all Hams.

Acknowledgement

The author wishes to thank Bryan VE3ZRK, for his assistance with the fabrication of the common mode test bed that was used for this study.

Further study using TCA Hotlinks

Further information is provided with TCA hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink 1 A Ham's Guide to RFI. <http://www.audiosystemsgroup.com/RFI-Ham.pdf>

TCA Hotlink 2 Understanding Common Mode Signals. <http://www.maxim-ic.com/app-notes/index.mvp/id/2045>

TCA Hotlink 3 Fair-Rite Data Sheets. <http://www.fair-rite.com/newfair/index.htm>

TCA Hotlink 4 The Pin 1 Problem. <http://pin1problem.com/>

Until later, VY 73

David, VE3KL

Homebrewing an Antenna Rotator

by David Mulder ZL4DK

After obtaining a second-hand tower I needed to sort out a decent rotator. Since I was looking to put up a stack of 4 Yagis for a small 2 metre EME array I would need a fairly solid rotator but a commercial unit able to do the job was likely to be outside of my budget.

Fortunately I managed to obtain a surplus worm gear of considerable size; this had a steel worm screw and a bronze worm wheel and came complete with a simple but solid open housing. After some careful measurement I found the gear would just fit inside the triangular mast section. I wanted to make my mast tilt over so that it would be easy to work on the aerials, preamp etc which meant mounting the heavy gear in the lower half of the mast to keep weight at the top of the mast low. A 32mm pipe running from this gear up the middle of the tower and out through a couple of bushings at the top, would carry the antennas.

Mast.

Peter ZL4LV helped me extensively with this project. With his help and advice I cut the shaft that was originally in the centre of the worm wheel and we turned down the end of this shaft to fit inside the 32mm pipe. We considered welding this solidly to the pipe but in the end opted for drilling and tapping the shaft so that two 10mm bolts firmly clamped the pipe to the shaft. Note that this join needs to be very tight. Any slight slop would allow the antennas to rock back and forth in the wind and likely lead to eventual failure. A couple of bits of angle iron welded to the mast formed a mounting for the gear housing and some further drilling and tapping allowed this to bolt firmly into place.

I looked at a number of different options for motors to drive the rotator. Ideally an antenna should rotate 360° in about 30-60 seconds. Any faster and there will be too much shock loading on the antenna array when the motor starts. Any slower and waiting for the antenna to turn will become frustrating and peaking up direction on a signal with QSB will be difficult. Peter uses variable speed motors on his own rotators along with a complex control system that provides high speed rotation yet soft starting and stopping.

My worm and spur gear has a reduction of 50:1. Peter came up with a motor and gearbox from a junked photocopy machine that had an output speed of 105rpm. Unfortunately this motor had no obvious way of reversing its direction. According to the nameplate it was a 110V 50Hz motor that required a 15µF running capacitor. There were three wires connected to the motor and a quick check with an ohmmeter showed that the three wires were connected to 2 windings on the motor (one wire was common). One winding had a resistance of 7Ω, and the other winding had a resistance of 14Ω. There was no easy apparent way of dismantling the motor to separate the common point of the windings.

Chain Drive.

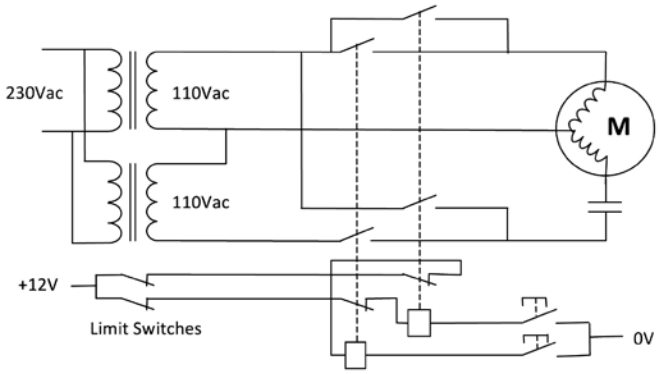
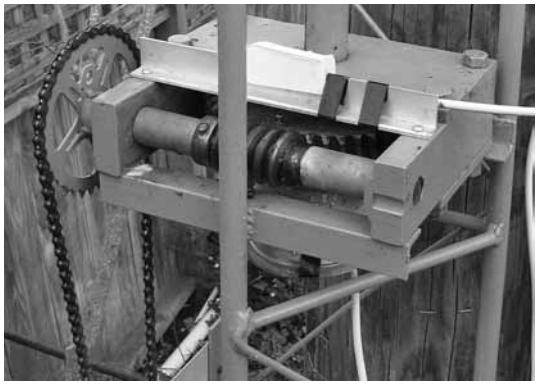


Figure 1. Rotator drive motor schematic.

I assumed that motor was a single-phase induction motor that used a capacitor – fed second winding at 90° degrees to the main winding to give the direction of rotation. I wired a 15µF capacitor in series with the higher resistance winding and applied 110V from a transformer to the motor and it started and ran smoothly. Connecting the capacitor in series with the lower resistance winding and feeding the higher resistance winding directly caused the motor to start and run in the opposite direction but the starting (and running) torque was very poor. Replacing the capacitor with a higher value one improved the torque in this direction slightly but it was still marginal for my application. Ideally the rotation direction would be reversed by reversing the connections



Worm Gear.

Position Sensor.

A simple stepper motor drive circuit

by John RL Walker ZL3IB

Figure 1 shows a very simple circuit for driving a small stepper motor. It uses a minimum of components and could be useful for the remote control of variable capacitors in situations like remote antenna tuners or magnetic loop antennas, etc. The circuit is based on an original idea by Geoff G3YVF and published in SPRAT *((Autumn 2010, No.144, p30-31).*

Stepper motors can often be salvaged from office equipment such disk drives, DVD players, printers, faxes, photocopiers, etc; or even purchased from electronics stores. Most small stepper motors will usually operate on 5V or 9-12V DC. A useful introduction to their principles of operation may be found on Wikipedia <http://en.wikipedia.org/wiki/Stepper_motor>. The motor will have a five or more coloured leads and an ohmmeter check should enable you to sort out how they are connected. Typically you may find four coils with a common centre connection or all four may be independent. A Google® search may help you sort them out.

My motor happened to be a Type KP39HM2-S07A with two red common leads which go to +ve whilst the coloured leads need to be individually connected to –ve in the following order to make the rotor turn clockwise in 1.8° steps:-

Yellow 1 >
Brown 2 >
Orange 3 >
Black 4>

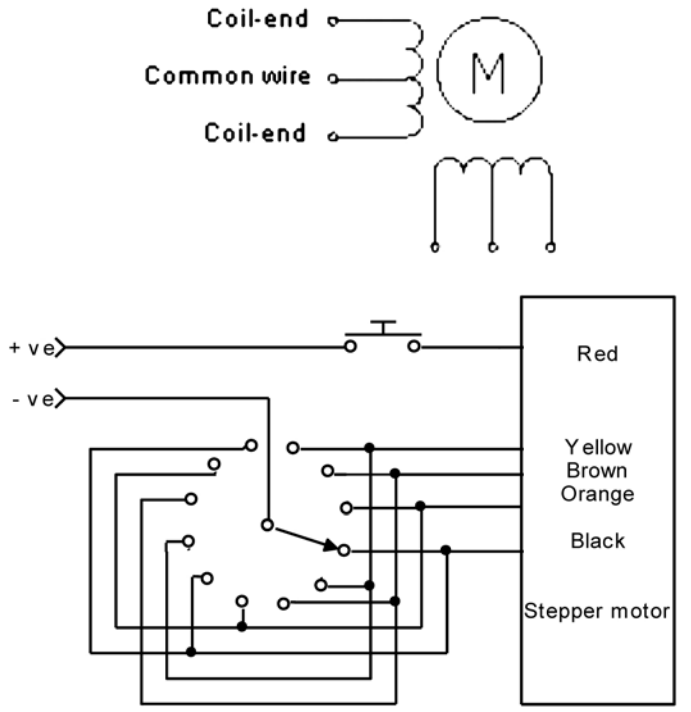
Simply reverse this order for anti-clockwise operation. If the operation is not smooth you will need to swap the leads around until you find the correct phasing.

This sequential switching is normally achieved electronically but in this 'no-frills' system it is done by means of an 8 or 12 point rotary switch as shown in Figure 1. The push-switch is to avoid leaving power applied to the motor coils which might otherwise overheat.

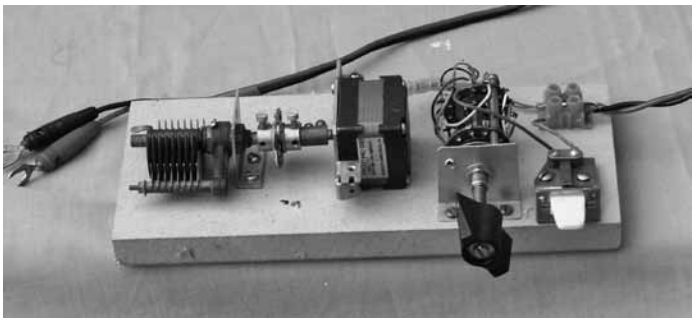
The rotary switch needs to be a single pole type with 4, 8 or 12 ways (eg multiples of 4). To make it easy to turn remove the end stops and detent locator balls. A crank-type knob may be desirable. Now simply rotating the switch should make the motor turn.

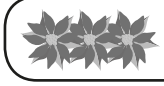
To use this device you will to need devise some sort of flexible coupling and it maybe useful to insert a simple ball drive or similar reduction gear between the motor and the variable capacitor to give finer control. If the variable capacitor is a 360° rotation type you will not have to worry about limit switches.

The photo shows my early development model. βi



Stepper motor driver.




Seasons Greetings from the team at NZART

on the capacitor connected winding but unfortunately the windings were connected to a common point that I could not separate. Eventually I concluded that I could reverse the phasing of this winding with the aid of a transformer. Since I needed a transformer to drop the voltage for the motor anyway this didn't add a great deal of complexity.

I used a bicycle chain and cogs to connect the motor to my worm gear. This gave me a further reduction and a final turning speed for my antenna of 60 seconds for 360°. I drilled and tapped the worm wheel to fit a bolt to engage some limit switches and wired the final control system as shown in the schematic.

Accurate rotator position indication is not a simple task especially for the accuracy needed for high gain VHF or UHF aerials. The main problem is that backlash in the gearing quickly adds up to become a significant error. Ideally the indication system should be driven directly from the main shaft rather than from any geared point.

With Peter's lathe we drilled a small diameter hole in the bottom end of the main shaft and glued a 6mm shaft into this. Since this shaft turns 360° I cannot connect a standard potentiometer (which usually only turn about 270°) directly to this shaft. At present I have fitted a small gear that drives a ten-turn potentiometer over a three turn range. However, in the future I would prefer to directly drive a three-turn potentiometer. I scale the output of the potentiometer with an op-amp.

It is difficult to perfectly align any shaft; hence if the potentiometer is solidly coupled to the shaft it will wobble slightly as the shaft turns. It is possible to use some form of flexible coupling on the shaft but generally it is simpler to allow for a small amount of flexing in the potentiometer mount; say by holding it with a thin, bendable metal strip.

The photos show the final results. I have yet to build the EME antennas and currently only have small 6 metre and 2 metre Yagis on the mast. βi

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DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

During the Rugby World Cup two special calls were activated, ZL6RWC organised by Papakura Branch, and ZL4RUGBY by Paul ZL4PW. This is from Paul:

"I used the call-sign ZL4RUGBY from 19 August through to 31 October, to celebrate the playing of the World Cup in New Zealand. The length of the call-sign was a problem for some and no doubt there will be some rejected cards.

The call was used on the HF bands with 10,250 QSOs made using CW, RTTY, SSB, PSK63 and PSK125 modes.The rig used was an Elecraft K3 with an Elecraft KPA500 linear amplifier occasionally. Antennas comprised a 20-6m 3 element SteppIR up 8 m and a "43-footer" vertical with SGC-230 coupler for 160-30m.

The 10m band coincidentally opened nicely with some good pile-ups from the USA, Japan and Europe. Pile-ups long-path into Europe on 20m in the early evenings were the most productive.

QSOs by ZL4RUGBY

	CW	DIG	PHO	Total
6m	0	0	0	0
10m	1213	29	182	1424
12m	543	2	178	723
15m	384	94	24	502
17m	1307	7	844	2158
20m	2093	527	2392	5012
30m	316	0	0	316
40m	14	0	0	14
80m	19	0	1	20
160m	0	0	0	0
Total	5889	659	3621	10169
Others	-	-	-	81

Interest from foreign hams was much higher than expected with many very aware of the tournament and watching games on TV. Not many of the VKs who were very vocal before the semi called again!

Cards will be printed soon and all QSOs were uploaded to Logbook of the World and Clublog.

One of the highlights was receiving messages from hams following contacts. One in particular stood out. G5CL Ryan was one of the very last QSOs on 31 October. Conditions were not good with local QRN playing havoc. Here is Ryan's e-mail:

"Hello Paul, I appreciate you have an online log, but could I just check you have me in your log this morning at 0833 on 14.017? The only reason I ask is that if I am I will be over the moon for the following reasons:

- *You will be my first ever ZL in 26 years on the key.*
- *I was only using 5 watts from my K1 in to a 20m long wire up 10m.*
- *I was just going out the door to work and gave a call on the off chance expecting nothing due to the huge EU QRM this side.*

I appreciate your time in reading this email and fingers crossed!"

It is moments like this that make all the effort of CQing, printing QSL cards etc very worthwhile. So what next? ZL4GAMES, ZL4KIWI? Maybe. but you can safely write off ZL4NETBALL!

Regards, Paul"

With over 10 000 QSOs, Paul must have put in more time and effort than the All Blacks.

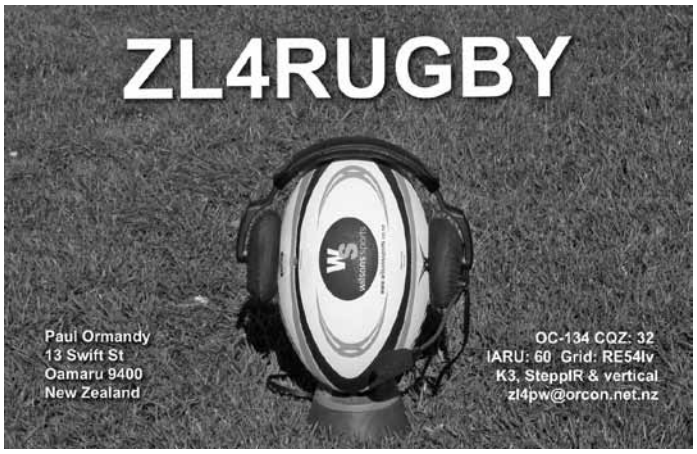
Special ZL call-signs are available on application to Debby at NZART and cost $50.00.

Amateur radio did continue during the World Cup, and we were fortunate to have four large DXpeditions in Oceania during September and October, YJ0VK Vanuatu, 3D2R Rotuma Island, T32C East Kiribati, and 4W6A Timor Leste. They were all multi-operator events, T32C had 16 transceivers with linears, 41 operators for a month and over 200k QSOs. The T32C operation must have been Kiribati Island's main source of income for October. Nauru C21, and the Marquesas TX7M also had DXpeditions. All this DX was reasonably close to New Zealand and many ZL operators took the opportunities to work them on many bands and modes.

Further afield OJ0X on Market Reef in the Gulf of Bothnia near Finland was a new one for many.

Ivory Coast, Guinea, Bhutan and Ascension Island were on the air to the joy of some ZLs and the chagrin of others.

Steven ZL4CZ activated ZK2AB on Niue, incidentally giving the writer ZK2 10m for the first time and a very prompt QSL; thanks Steven.



Paul Ormandy ZL4RUGBY's QSL card

From around ZL

"10m has been great all day, LP to EU and AF in the mornings and SP in the evenings. It was still wide open to EU when I finally went to bed one night at 13:30z." *Gary ZL2iFB*

"The 80 m DX season has started; 3.500 to 3.510 on CW around sunset. The normal gang from Scandinavia and the UK appear most days including Western Europe. In the mornings on or around sunrise there are good signals from Russia and Eastern Europe." *Bill ZL3NB*

And from the other side of world :

"I heard a 9H1 on 18.115 at 1842z today 5x5 calling CQ. I gave a few calls but no contact. Heard an EA3 on 20 5x9. Ten metres is good some days to Eastern states of USA and I've worked all over the world in the past few weeks, The best catch was T32C on East Kiribati on 10m and another 8 QSOs on the other bands." *Peter G3PHO*

DX net for ZLs is being run by ZL2TZE and is well worth coming up on Tuesday nights at 8pm (note time is ZL local time) on 3777 kHz ± qrm.

Propagation continues to improve with the SFI up to 160 recently. The graph doesn't show a marked increase over the year and the higher bands like 10m don't necessarily improve the moment the SFI increases, but there have been a couple of significant peaks. The peak around 26 February was followed three weeks later by amazing 10m propagation to Africa, the most difficult continent to work from ZL.

The 2010 Oceania Contest results published in last month's *Break-In* shows a total of only 101 10m contacts by all 38 contestants over two weekends. This year the 10m band was wide open with quite a few easily exceeding that number by themselves in the SSB weekend only.

Santa won't be calling here:

1. The W6 calling CQ – CQ 17 times in a row, then CQ DX twice, and finally his call twice.

2. Any digital operators, particularly using PSK31, who have very lengthy sign-offs which seem to include mountains of useless info – like the mode, frequency, his QSO number, blood group and mother's maiden name.

To all the others, I'd like to wish you all a very Merry Christmas and great 2012. A special thanks to readers who have supported this column with contributions this year.

Graeme

DXpeditions;

Plenty to look forward to:

Afghanistan T6MO for next 12 months and T6FR November 2011.

Angola D2QV Valery is active on CW, SSB and RTTY: 40m/20m/17m/15m/12m/10m till July 2012.

Antarctica ZS7KX Gerard on 14.175MHz around 1400 UTC until Feb 2012. May be on 18MHz also

Belize V31NB 16–27 December

Burundi 9U3TMM between 28 December and 4 January (2012).

Burundi 9U look for HA3JB, now living there. 20m SSB and PSK31.

Djibouti J28RO until July 2012.

Franz Josef Land R1I two hams are wintering over until September 2012.

Palmyra and Jarvis Islands KH5 November/December.

Malpelo HK0NA Jan/Feb 2012.

Extending the life of Diamond® co-linear antennas

By Dick Greenbank ZL2TGQ

The Diamond® Antenna Corporation produce a range of dual-band and tri-band base station antennas for Amateur use. The range includes, for example, models X30 through to X500, see <http://www.diamond-ant.co.jp/english/amateur/antenna/>. *These variously provide access to the 2m, 70cm and 23cm bands, with the added convenience of a single coax to the shack.*

The manufacturer rates these for wind velocities of from 40 metres/second (144 km/h, 90 mph) for the larger models to 60 m/s (216 km/h, 134 mph) for the smaller models. Regrettably however, these do not always stand up well to the "roaring forties" conditions experienced here in New Zealand. A weakness in the base mounting arrangement can lead to the early demise of these antennas, especially those mounted in exposed situations.

The antennas are constructed with a glass-fibre reinforced plastic tubular outer shell, glued to an aluminium boss. The boss mounts into an aluminium tube, or pipe, which forms part of the mounting arrangement. The boss is a clearance fit inside the tube, and is clamped in the tube by only a single lock screw.

Under the stress of whipping in the wind, the clamping by the single lock screw proves to be inadequate. The screw works loose in the soft metal boss, then works itself so as to elongate the hole in the tube. Wear occurs at the top and bottom of the boss and produces a "barrel" shaped form, accelerating further wear; *see photo 1.* The consequence of continued whipping is that the screw may tear out of the tube, or worse still it can lead to catastrophic failure of the tube; *see photo 2.*

Such damage can be avoided by the addition of adequate clamping of the aluminium tube to the boss. This can be simply, and cheaply, achieved by the addition of an automotive exhaust pipe clamp, fitted above the lock screw. A suitable after-market item is available from automotive parts suppliers at a cost of approximately $7.

To prepare the aluminium tube, cut a longitudinal slot 20 mm in length from the top end, and on the side opposite the lock screw hole. Use a modelling, or Junior®, hacksaw to make a cut about 1 mm wide.

Procure an appropriate size exhaust pipe clamp, (32mm for model X30, X50 etc), for example, Repco® Part Number EC32U. The clamp and U-bolt are made of SAE 1-2 grade low carbon steel, nickel plated, and it is beneficial to apply an additional protective coating to ensure long-life. To prepare the clamp, remove the nuts and then mask the threaded portions of the U-bolt. Clean the clamp body and the U-bolt, then spray with zinc-rich galvanising paint. Suitable paint is available from hardware and paint vendors, for example, Rust-Oleum® cold galvanising compound.

To assemble, first slide the aluminium tube over the co-ax cable, connect the cable, then slide the tube over the boss and fix them together using the lock screw. Next, remove the masking from the U-bolt threaded parts, and assemble the exhaust clamp above the lock screw and tighten, (torque to 8Nm, 6 lb/lbf). To provide greater security, lock nuts may be added to the U-bolt at this time. These may be obtained from hardware outlets, size M8 galvanised. To finish, spray the nuts and any exposed threaded portions with zinc-rich galvanising paint; see Photo Three.

This simple reinforcement provides a robust solution, which will ensure longer service from these antennas. βi

Marshall Islands V73NS for next three years.

Namibia V5 December and January. Call-sign suffix will be op's home call.

Niue, ZK2V until 20 December.

Sable Is CY0 from 29 December to 6 January .

Singapore 9V1RM for the next three years.

Temotu Province H40FK and HK0FN February 2012, including 160m and 6m.

Zambia 9J2RI until 2012.

ZL Special Calls – none advised for this issue.

Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. On Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250 kHz; host JY5HX and features exotic Middle East calls.

ZL DXers: Tuesdays 8pm 3777kHz

What's on the air now? <www.DXsummit.fi/DxSpots.aspx>

Announced operations: <www.ng3k.com/Misc/aDXo.html>

QSL information: <www.qrz.com>

Sunspots: <www.solarcycle24.com/>

Acknowledgements

ARRL DX, OPDX DXNL(Darc) ARLD044 DX News.

Contact me at Call-Book address or by email at <graemeh@xtra.co.nz>.

Back again – Dayton 2011

by Jim Reed ZL1LC

After the trip to Dayton's Hamvention in 2010, I thought I could offer my services to others who may like to go with me if I went in 2011, so I threw out a fish hook out in the form of an advert in Hamads. Six people replied but some were frightened off by the expected costs of up to $4000 plus goodies from the Hamvention.

In the end, Hal ZL1AWR and John ZL1BHQ decided to go. I met Hal at the Suburban Radio Junk Sale but the first time we all got together was at Hal's QTH in Hamilton; then we had another rendezvous before the final meeting at the Hamilton Junk Sale, a few days before we flew out. It's quite important for strangers to meet and greet a little before setting off on more than a week together, especially with two of the three having nice fresh New Zealand passports and never having been to the destination country.

We booked the USA travel, rental car and accommodation. As a pre-requisite, I had sent out an "*in case of emergency*" form where we listed next of kin, doctors etc and this was to be kept in an envelope with the passport and tickets. Fortunately we never had to open anyone's envelope.

On Tuesday 17 May we met at Auckland Airport in plenty of time to board. The plane was fairly full but our travel agent had managed to get us up the front of cattle class.

San Francisco was foggy, wet and a cool 12° and there were no problems with Customs etc. We got through to Chicago but then the trip to Dayton was delayed 90 minutes due to the late arrival of the aircraft. The real problem was that the rental car company closed at midnight and we would arrive around 1 am so I had to cancel the rental.

When we got to Dayton, I sorted out the Budget™ rental car while Hal and John picked up the bags. Unfortunately there were only two bags not three; John's bag was missing so he logged a claim and we finally got to the hotel around 2 am.

Wednesday 18 May; there was still no sign of John's bag so he called the airline and had to go through the challenge of logging it as missing, again.

We made a trip to the local mall and checked out Radio Shack and Sears. Radio Shack was a little disappointing. Walmart was just down the street and John managed to stock up on a few things that he wouldn't normally have needed if his luggage had kept up with him. Then there was challenge to find a bank/ATM for the boys to unload some funds from their Visa® cards; we tried a couple of ATMs and banks before we struck pay dirt.

Back at the hotel, my order from Hank Breedlove Engineering had arrived. It was a set of machined antenna mounts for my mobile antenna. Great stuff and will look even better once I have them chromed. (Postscript; the chrome plating cost three times the machined mounts!)

Checking the internet for the 'Four Days In May' (FDIM) QRP session on the Thursday, I discovered that we could register before the seminar. The seminar was just 500m away so Hal and I went over the road to the Holiday Inn and stood in the queue for a while, then had a look at the mobile antenna installations in the parking lot. There were plenty to choose from, ranging from a super large screwdriver rig that could support 2kW, down to mag mount VHF ones. Finally we checked into the Four Days In May conference and received our ID tags and goodie bags from MFJ.

Ann and George Dobbs G3RJV.

Quiet Friday morning.

On Saturday the arena was very busy.

On Thursday I awoke with the minimum of sleep under my belt. John managed to get re-associated with his bag. I took John into town for his day at the Contest University seminar. Then I met Hal and walked over to the Holiday Inn for the Four Days in May.

The first session was about an acoustic filter made from copper tubing based on a design from a 1928 *QST* magazine and the background about the author. The filter was a failure as it rang, however the lecturer came up with a design for a Bessel filter that should work but hadn't had the time to make it. A couple of Ohio professors worked over the basic crystal set and explained how, using modern knowledge, they could really make it work, provided the input and output impedances were matched. They then went onto slope detecting FM broadcast signals, using a crystal diode, and amplifying them. In true crystal set format, the amplifier was not powered by batteries as they used a second crystal set to detect an AM signal from a nearby transmitter, and that in turn charged a super capacitor.

George Dobbs G3RJV, kept us entertained talking about his workshop and how he has downsized it since he moved from a 16 room vicarage to a six room retirement house. He also covered his discoveries in oscillators, which have appeared in recent *Practical Wireless* magazines. His latest being what he calls a 'Franklin oscillator' which has a wide range (only three coils needed from 1.6–30 MHz) and having a fairly constant amplitude across the range.

After lunch K1JT told us all about his slow speed digital tools JT65

and WSPR. JT65 is a slow speed (13 characters per minute) signaling system that can work through noise. (I've used it for a number of contacts and my best story is 5W from New Zealand to the United Kingdom, one way) It was developed for VHF moon bounce but the version I use is for HF.

WSPR is a beacon-like system where low powered transmitters, controlled by PCs broadcast and receivers using the same application, track them down. The receive data is uploaded to a database at <www.wsprnet.com> where reports are available showing activity on a band by band or by individual transmitter. It also has the ability to resolve frequencies and is often used in frequency measuring competitions.

The last two sessions were on software defined radio without the maths which looked like a Death by PowerPoint session, and Buildathons for Kids, so I snuck back to the hotel for a couple of hours sleep.

John caught a cab back from an enjoyable day at the Contest University; at $18 not a bad taxi fare. Unfortunately we had to go back to the Crown Plaza to pick up his backpack that was still hanging on the chair where he had left it. We called into Walmart for a few more clothes and some sleeping tablets and then had dinner at the Red Lobster for a change from steak.

Friday 20 May. The jet lag was still holding on. We started out early and were at the swap meet before the gates were open into the outdoor flea market area. We did an hour's tour of the flea market area and covered about one fifth of the stalls, then queued for the opening of the interior exhibitors.

John ZL1BHQ sneaking home for a good sleep!

Hal ZL1AWR looking a little jaded from the long flight.

As a matter of interest, there were 1795 occupied flea market spaces outside with 742 individual stall holders and inside there were 480 stalls and 256 discrete stall holders. Just a little bit bigger than the show in Hamilton the previous weekend.

Our first call, after identifying the Buddipole area, which was to be our rendezvous point, was the QRP wall where we picked up a couple of neat t-shirts from the Michigan QRP club. I also managed to twist Hal's arm into buying a hand-made brass keyer which weighed five pounds; that had to be the bargain of the day.

We saw the mad cyclist with the 500W back warmer. There's a clip on Youtube that his back pack linear has been tested at over 2 kW. We met up at midday and went back to the car to unload. The day was warm, around 22°C, fine and sunny.

Saturday 21 May was a bit of a shambles at the start. For some reason, I never got the 7 am wakeup call and neither did John so it was a belated 9:30 am when we arrived at the Hamvention parking area. When we hopped in the bus from the car park to the Hamvention we sat down the back. Then someone sat opposite us; it was Rob ZL1RD. We were supposed to catch him on Friday but failed. Pure luck!

There were more people around than on Friday, but I believe there were less than last year. In fact, looking at the prize winning numbers that were drawn, I am not sure if there were more than 20 000 hams attending over the weekend. Many people that we talked to complained that the high prices of gasoline were the cause of making people stay home.

I caught up with some Good Ol' Boys from North Carolina. About half a dozen came up for the Hamvention and had a number of bits and pieces to sell. However looking at the team, I reckon they spent more at the bar in the evening than they managed to sell during the day. Still they had a great time and were very generous to a wandering Kiwi.

One thing that made life difficult during the day was the failure of the sewage system for the complex. Sewage flowed across areas of the car park, stalls had to move and all the inside toilets were shut. Only portaloos serviced the area. They cleaned it up quickly but the smell lingered.

I did catch up with the HF Pack gang. This is a special interest group who set up their radios in man pack mode. There were some pretty well known QRPers there and I was pleased to meet a number whom I have only seen on Youtube.

Steve WG0AT, is famous on Youtube for his field trips with his two pack goats, "Rooster and Peanut"; search Youtube for Goathiker. Budd W3FF, the originator of the Buddipole was there and Alex PY1AHD was there too with his magnetic loop antenna. Look for Budd on Youtube or at <www.buddipole.com> and Alex is at <www.alexloop.com>. All were great people to chat to. Real hams!

That evening I dropped John off at the Contest University dinner whilst Hal and I went to the Holiday Inn for the FDIM QRP dinner. We were at a multi-national table with three Canadians, one from Hawaii, two Russians, one with a VA call and the other with a USA based call, one local from Ohio and us. It was a very interesting evening. The Russians were very famous in QRP circles; Oleg, RV3GM, was the founder of

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Budd W3FF, from Buddipole.

HF Pack gathering with Steve WG0AT and Budd W3FF.

Steve WG0AT left Rooster and Peanut behind.

Alex PY1AHD with his HF loop.

◂ continued from page 13

the Russian QRP Club and Igor, now VA3ZNW, is the author of the *Atentop* magazine, which can be found at <www.atentop.org>.

Our table picked up a few prizes from the generous prize draw. One of the Canadians picked up a power supply, Hal won a synthesizer kit set and a micro paddle key and I was lucky enough to win a kitset for an external direct entry keyboard for an FT817. The top prizes for the evening were an Elecraft K3 kit and a Flexiradio 1500. Not bad chances for a small group of less than 300.

Sunday 21 May saw us at the car park around 9 am and by 11 am we were on our way again. The outside flea market area had a minimal number of stall holders left. Inside it was busy and stall holders were doing well, but I think they could have done better.

We had lunch at the US Air Force Museum and then spent a few hours wandering around the great displays. It is an excellent facility, but there's not much else in Dayton for tourists to do and see.

On Monday, we leisurely drove out to the airport and dropped off the car. The flight was due to depart at 1:12 pm and as we were there before 11 am, we thought we had plenty of time. Wrong! The earlier 10:30 am flight from Dayton to Chicago had been cancelled and there were people hassling the two attendants for off-loaded baggage and ticket refunds.

When we finally got served, the scales were reading 2.5 pounds with nothing on them so I had to quickly shuffle the load to avoid an overweight payment. By midday, we finally had our baggage heading for Auckland and boarding passes in our hands.

At the gate, just before boarding, we were given seats and the plane was full. The one hour trip to Chicago was smooth and it was warm and windy when we landed. We were a little late leaving Chicago, but because of a tail wind, we were on time into Los Angeles.

In LAX we walked all the way from Terminal 7 to Terminal 2. At both Chicago and LAX we were scanned with millimeter microwave, which effectively strips the clothing off the subject. The scan is viewed by someone remote who then radios back to the security guard to release the passenger or not. It was sensitive enough to spot that I had a metal clip on my watch strap. Of course we had to take off our shoes and belts and empty our pockets.

The trip back down to New Zealand wasn't too bad. The sleeping tablet probably helped. John spread out over four seats and had a good sleep. We all quickly cleared Customs and the shuttles were there to meet Hal and John.

If we did it again, there are only a few minor changes that I would make:

- Try another airline besides United.
- Land at Cincinnati instead of Dayton. It's a bigger city and should have better connections and more flights. It's only 70 miles from Dayton.
- Stay another week and go to the Indianapolis 500, the weekend after the Hamvention. Hal suddenly thought about it as we were leaving. βi

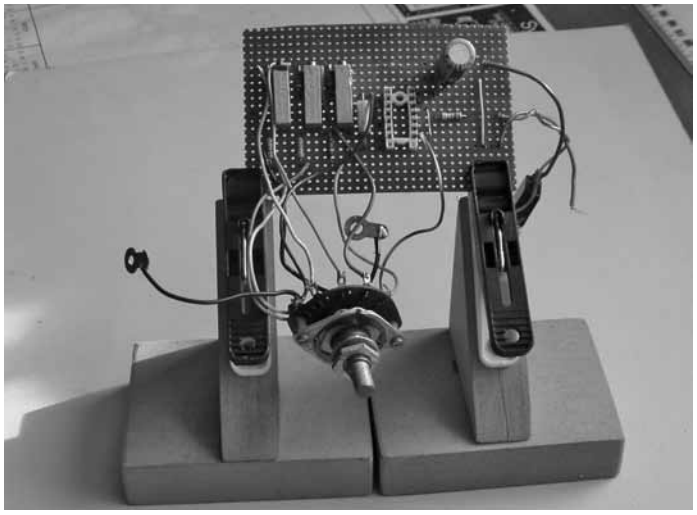
Workshop Hints & Kinks

Cheap and easy PCB holders

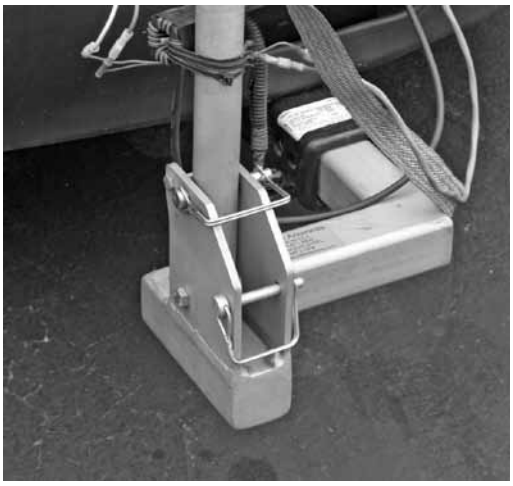
When assembling circuits on PC boards, or trying to service them, I often feel the need for a simple holding device with non-conducting clamps. The simple jigs shown below were assembled from plastic or wooden clothes pegs and small pieces of MDF board. I think the photos are self-explanatory.

These simple holders have also proved to be very useful when trying to solder wires to coaxial plugs, headphone jacks etc.

John Walker ZL3IB



Above and below: John ZL3IB's "el-cheapo" PC board holders.



A nuggety mobile antenna base.

You can find setups like this in Hamiltron.

Even a 2m antenna in her hair.

E51AAO — My holiday DXpedition

by Bruce Steel ZL1AAO

Winter had barely arrived and I said to Rachel lets organise a winter break. One thing led to another and we decided on Rarotonga, South Cook Islands. Neither of us had been there before but as a holiday destination it sounded very appealing. Like many New Zealand DXers I have spoken to Victor E51CG and Jim E51JD and looked at their QRZ information. So was sown the seed to organise my own mini-holiday style DXpedition.

A visit to our usual travel agent provided us with some details, flight times and availability. We agreed on a close to beach location for "our own reasons" and then it was down to prices and availability. We settled on Muri Beachcomber which ended up providing us accommodation in a unit only 25 metres from the high tide line. A direct email to them from me confirmed that it would be OK to erect simple antennas for amateur radio use. This is a very popular beach resort area and safe swimming and snorkelling. There are also restaurants, car hire, cafes, small local stores and take-away food places along the main road nearby.

I found a NZART *CallBook* with Cook Island Amateur listings and via QRZ.com found some email addresses. I set about contacting both resident amateurs and some who had visited there and operated holiday style. We are a friendly bunch generally and before long I had some tips on where to eat out, which places had been good to operate from, who I really must catch up with and some ideas about antennas. Oh, and most importantly, where and how to obtain my license.

Via email I was able to establish what to do and began the process of obtaining my license. I was told that E51AAO was available so knew well in advance that would be my call-sign. I scanned a copy of my New Zealand license and my passport and emailed them to the Telecom Office in Avarua, Rarotonga <www.telecom.co.ck> and all that I had to do the day of my arrival was front up, say who I was, pay my $NZ20 and be given my Cook Island Amateur Radio License which is valid for 1 year.

I began to prepare my equipment thinking of the baggage limits and as some readers may be aware ran into some difficulties. I began with my Yaesu FT857D, LDG AT100 Pro Auto Tuner, and 23 A Mydel switch-mode PSU and the lightest of my SWR/Power meters. So 8 weeks out from the trip this was my preferred option.

I began working on two antennas. Murphy struck during this period of operation and testing antennas as the Yaesu developed an output fault. So, on to rig two, a Kenwood TS50 but after three weeks of flawless operation more problems. Not to be outdone I had about three weeks to get familiar with a Kenwood TS570D which I had purchased earlier this year on TradeMe® as part of a deceased estate. Therefore, as documented elsewhere, I travelled with the TS570D as my carry-on baggage! As the TS570 has a built in tuner I did not take the LDG tuner. The Mydel PSU performed great and I used my SWR/Power meter to monitor the output.

I have had some success with a "Jackite" telescoping fiberglass pole supporting a wire vertical with 8 tuned radials so this was reconstructed and tested with positive results. This was to be one option. Everyone has heard how well verticals perform next to, or over salt water. I got to thinking about how it could be more versatile and become multi-band so 20, 17, 15, 10 bands were added using cut up ice cream cartons as insulators. I also added four radials for each of those bands. This was a bit delicate but it worked, meaning that with only one change I could disconnect/connect between 40m and the other bands.

I researched multiband dipoles and after a couple that failed to perform I came up with a Zepp design. 65ft tip to tip, centre-fed with 300 ohm (or 450 ohm) ribbon, MFJ 4:1 Balun and random length 50 ohm coax. (I used the 300 ohm ribbon due to the slight advantage in weight over 450 ohm.) I also found some information on feed line radiation and elected on a non-resonant length

Bruce operating as E51AAO, Rarotonga.

which I hoped would be suitable for my unsighted operating location. Anyway whilst testing on 40m I worked E51BQ Bob who told me he lived at Muri Beach so knew this would be the one!

As it turned out the operating height of the dipole was 25-30 feet. And it performed! (Google and check out "NB6zep") Most of my QSOs were made using the dipole.

In addition to the above I carried 25 metres of RG58 coax; some basic tools and three short patch leads for interconnecting the equipment. Headphones were also squeezed in to help my listening and keep the peace. Importantly a small telescopic fishing rod and reel!

This was used to launch a 1oz lead sinker over the nearby coconut palms and to haul up the dipole antenna. I tried tying it up with fibrous garden twine but this broke after three or four days due to the coconut palm movement in wind fraying through the twine. In the end the 15kg fishing nylon lasted out my operation.

E51AAO was on the air between 20-28 August 2011. I really enjoyed the challenge of this holiday style operation and will certainly visit Rarotonga again. I was planning that before we left! The PSU and 25 metres coax await my return. Bob E51BQ who lives at Muri Beach has them in safe custody for me or any other visiting Amateur who may require to borrow them.

I enjoyed the pile ups and 432 SSB QSOs with 47 DXCC entities; 40m – 14, 20m – 297, 17m – 22, 15m – 78, 12m – 6 and 10m – 15.

We both had a great time and I had the pleasure of meeting and having lunch with Victor E51CG and his wife, Eleanor, Jim E51JD, Bob E51BQ and Andy E51AND who was visiting from Oregon. Rachel and I later paid Victor and Eleanor a visit at their home. Next time I want to do this in daylight so that I can check out his towers and antennas.

Also next time we will plan for a longer stay and of course some more radio operation!

COMING UP:

It is hoped to print the following articles in the next issue of *Break-In.*

- Double-sided demodulator; the Mk3 squaring loop.
- Down to basics with antennas, part 1.

More copy is needed urgently.

Closing date for next issue:

10 January 2012

The Morseman

Gary Bold ZL1AN
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Wilson Greatbatch, W2QBO

Today I digress to mark the passing of this man you've probably never heard of, and who died 27 September, 2011, aged 92 years. Wilson Greatbatch passed the US Ham license test aged 16, in 1935, in the golden years of CW. He would have been a CW operator, and an active one, for he and his Sea Scout Ham Station received a Red Cross citation for handling emergency traffic during the New England hurricane of 1937, in the golden years of CW.

But that's not why I remember him. In 1962 he built the first commercially successful body-implantable heart pacemaker, founded a firm to produce them, and later developed the battery that now powers almost all pacemakers in the world. He, thus, brought to many enormously enhanced quality of life, and indeed I know that some of you reading this use the devices he pioneered. An *LTspice* simulation of the circuit he first patented is shown in figure 1, and I used it for some years as an example for my electronics classes to ponder. I'll return to it later. Figure 2 is a photo of Wilson with the more sophisticated version he developed shortly afterwards. To demonstrate his circuits, he drew their diagrams on cardboard, then inserted and connected the physical components on top to produce a "working schematic", which is what the picture shows. I once had a larger copy of this photo from which I could read the component values, but I've lost it. If you have, send a copy to me?

See this You-Tube® video[1] of an interview with Wilson, which briefly shows the later circuit and recounts his other accomplishments in energy and environmental areas.

Background

In 1951, Greatbatch was an assistant professor at the University of Buffalo. In a lunch-time conversation with two brain surgeons the problem of "heart block" arose, a condition in which electrical signals triggering heart-beat failed to get through because of tissue degeneration. He thought "I knew that I could fix that, but not with the vacuum tube electronics we had then."

Pacemakers did exist, but they were mains-operated, the size of small refrigerators, and condemned the user to virtual immobility. The inserted terminals were crude, and sometimes caused burns. But nobody knew how to improve the technology.

Then transistors arrived, and in 1956 Greatbatch started experimenting with them. While developing a circuit to generate a 1 kHz marker pulse oscillator, he inserted a 10 MΩ base-biasing resistor instead of a 10 kΩ one by mistake. He later said "the circuit started to 'squeg' with a 1.8 ms pulse, followed by a one second quiescent interval. During the interval, the transistor was cut off and drew practically no current". He immediately recalled those earlier conversations, and realised that this accidental discovery could be used in a pacemaker. He resigned his job, set up a workshop in his barn, and studied the workings of the heart.

It took a while. Swedish surgeons actually implanted the first in-body pacemakers in 1958, but these lasted only a few months. Greatbatch's first implanted device was installed in 1960, and had greater success. The first patient died after 18 months, but a younger one lived for 30 years.

The first pacemaker circuit

Greatbatch patented the circuit shown in the lower pane of figure 1 in 1962. This is a blocking oscillator, a circuit quite well known now, but he must have originated it, or it wouldn't have been patentable. I don't know the original values of the components, so I've chosen some that work well to demonstrate what it does. The heart muscle is represented by the 100 kΩ resistor. If you have *LTspice* (see past columns), simulate it and examine the surprisingly complex waveforms.

Blocking oscillators spend most of their time (in this case about 99.99%) asleep, drawing little or no current. Interspersed with these long periods of hibernation, they have short periods (a few hundred microseconds) of violent activity.

The top pane shows the voltage induced across the heart, 38V pulses separated by 1.2 seconds. Expand the trace, and you'll see that these pulses are not only surprisingly large, but astonishingly short, only about 20µs long! They're preceded by a 140µs period when the transistor, triggered into saturation by heavy positive feedback through the coupled inductors, charges C_1. The narrow pulses are caused by the rapidly collapsing magnetic field in L_2 after the transistor turns off again. When all current flow ceases, the top end of C_1 returns to ground potential. Its base end is now at -4V, holding Q_1 hard off. This voltage rises exponentially as C_1 discharges through R_1 with a time constant of about a second – the period of the pulses. Then Q_1 turns on again, and the cycle repeats.

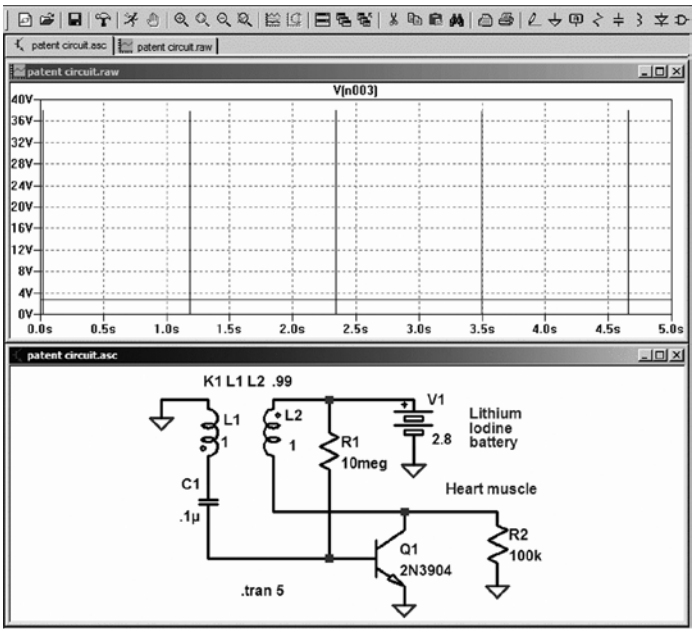

Figure 1: Greatbatch's first patented heart pace-maker.

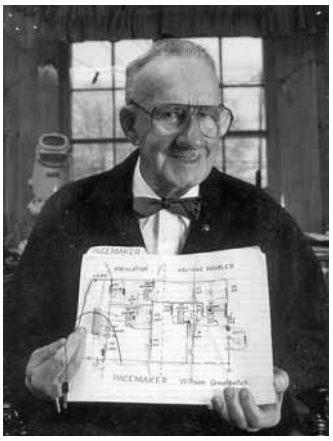

Figure 2: Greatbatch and the "working schematic" of his later pace-maker.

In a lab book about a year later, Greatbatch wrote "I seriously doubt if anything I ever do will give me the elation I felt that day when a two cubic inch electronic device of my own design controlled a living heart."

The battery problem

Although the peak current drawn from the battery in my simulation rises to 6 mA during the violent conduction transient, the average current is only 30µA, so batteries last a long time. But finding a suitable long-life battery, which did not leak, swell, or corrode in the body turned out to be an even greater problem than developing the circuit. Greatbatch formed another company in 1970 to tackle it, and eventually produced a Lithium-Iodine cell, having an operating voltage of about 2.8V. Other Lithium variants were later developed; in fact there are now dozens of Lithium based batteries with different chemistries and terminal voltages available. Some think that his development of the battery was an even greater achievement than the pacemaker.

A blocking oscillator code practice circuit

Here's another variant of this type of oscillator. I last published this, the simplest and most enthusiastic audio code-practice oscillator I know, in the June 2005 column. Figure 3 shows an *LTspice* simulation of the circuit. The 5Ω resistor represents a small speaker, salvaged from a dead transistor radio, and I've found that the PNP and NPN transistors can be

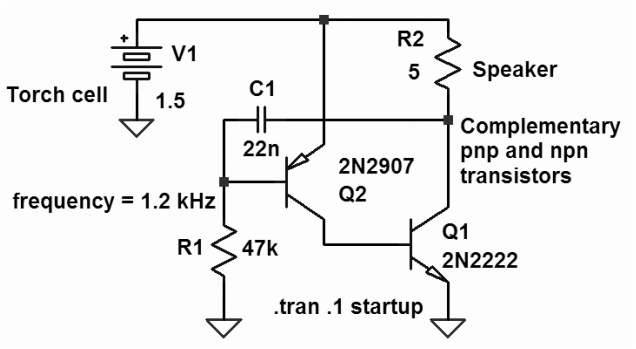

Figure 3: A code-practice audio blocking oscillator.

almost anything from the junkbox, though I have shown a couple of types that *LTspice* knows about. It runs from one torch cell which lasts a long time, since the average key-down current is 2-10 mA, depending on the components. If you replace the 47kΩ resistor with a 200kΩ pot, you can vary the frequency.

Again, it's educational to examine the *LTspice* simulation waveforms. At the start of a cycle, C_1 is initially uncharged, holding the base of Q_2 above 2V, cutting both transistors off. Charge leaks exponentially away through the 47kΩ resistor, and when the base voltage of Q_2 reaches about 1V, both transistors turn hard on, triggering the Q_1 current spike and recharging C_1. The cycle then repeats.

The speaker current spike is only a few tens of µs long, so the tone is harsh and penetrating, suitable for noisy environments. This is a great "starter" project for a construction evening for scouts or new recruits, as there are only six components, they're cheap, soldering or proto-board construction is quick, and you get something which makes a satisfying noise and is actually useful. How about using this in your next Branch recruitment activity?

Missing component

Jakey, G3JKY/ZL2JKY, pulled me up on the nostalgic home-brew transmitter I published in the last column:

"There's one vital component missing from the 807 circuit. It's wise to have a chunky RF choke across the pi-coupler output. It doesn't need anything fancy as it's at a low impedance point, but it needs to be able to blow the HT fuse in the event of failure of the coupling capacitor. Without it, the aerial might become lethal."

A good point, and Jakey is quite right. Did I have one there? I can't remember.

I was asked "Can *LTspice* model tube circuits like this?" Yes and no. Duncan, M0KGK has developed *LTspice* models for a number of vacuum tubes[2], and his web-page gives instructions on how to download them, with some sample circuits. It's interesting to compare the small-signal linear amplifier circuit simulations with similar circuits using transistors. However when I modelled a class C tube power output stage similar to the one in the last column, I found that the grid didn't conduct when positive, a necessary requirement for producing the bias voltage. I'm contacting Duncan to discuss this. More next time.

Who was Maskelyne?

In the last column I printed a description, sent by Graham ZL3GSL, of how someone called *Maskelyne* disrupted a public lecture demonstration of signal reception from Marconi's Poldhu station, given by Fleming in 1903. Who was this person? I'd never heard of him!

Little seems to be recorded about Nevil, but a lot is known about his Father, John Nevil Maskelyne, a stage magician who achieved fame by his widely publicised fraud-busting theatrical performances, in which he unmasked the tricks of illusionists, such as the spirit cabinet, a sealed box in which tightly bound musicians played musical instruments. He invented a "levitation" illusion, wrote the classic book on cheating in gambling[3], and also, unexpectedly, developed the pay toilet! His son, Nevil, inherited his father's talents, became a stage magician himself, and also developed a technical knowledge of wireless systems.

Marconi's first, apparently successful transatlantic transmission sent the submarine cable companies into shock. Would this new technology put them out of business? They hired Nevil Maskelyne to spy on him, and bankrolled him to set up a wireless station on the other side of the Bay from Marconi's Poldhu site to intercept his transmissions, and discover what progress he was making.

Nevil seems to have rapidly figured everything out, and constructed his own wireless apparatus. On the evening of Fleming's 1903 talk at the Royal Institution, he set up a transmitter close by, overpowering Marconi's incoming signals and writing embarrassing messages on the Morse printer, including the word "rats". This was a far more derogatory epithet than it is today. During the Boer War, the British, after heavily bombarding the Boer trenches, had asked them by heliograph "what do you think of that?" The Boers mockingly heliographed back "rats". The word came to symbolise "a warning against overwhelming pride". Fleming found this outrageously insulting, calling it "scientific hooliganism". He never discovered where the interference had come from.

This was not just a merry prank by a mischievious experimenter, but an orchestrated, clandestine sabotage operation backed by the cable companies to show that Marconi's system was not, as he had claimed, immune to either interference nor eavesdropping.

Maskelyne got this story into the newspapers, but it seems to have been soon forgotten. It was eclipsed by Marconi's later achievements, in particular the enabling of reliable communication with ships, making headlines nine years later by distress calls from the sinking Titanic . This was an area in which the cable companies could not compete, and Maskelyne, as far as I can determine, is not heard from again.

Solar cycle references

You'll be aware that the current solar cycle has been very unusual. Dr David Hathaway, of the NASA/Marshall Space Flight Centre, observed about a year ago "This is solar behaviour we haven't seen in living memory." He hosts a web-page[4] with extensive information about this, including possible implications for climate change. There's a good summary of the situation in a 2010 New Scientist article[5].

Last month's problem

See figure 4(a). A 40Ω, 40V Thevenin source is in series with two lossless quarter-wavelength transmission lines having characteristic impedances as shown. What voltage appears across the 10Ω resistive load?

The input and load resistances, R_{in} and R_L respectively, of a quarter-wave line of characteristic impedance Z_o are related by the expression $Z_o^2 = R_{in} R_L$. Use this to find, first, the input impedance of the right-hand line, then, using this as the load resistance of the left-hand line, the total input resistance. This comes to 40Ω, so the input voltage of the left-hand line is 40/2 = 20V. But all input power is transferred to the load in a lossless line system, so using voltage division, the voltage across the 10Ω load is 10V. See a detailed explanation on my webpage[6]. Only three solutions, all correct, were received from Ron ZL1AI, Ross ZL3TFK and Alastair ZL2ARC.

continued on page 18

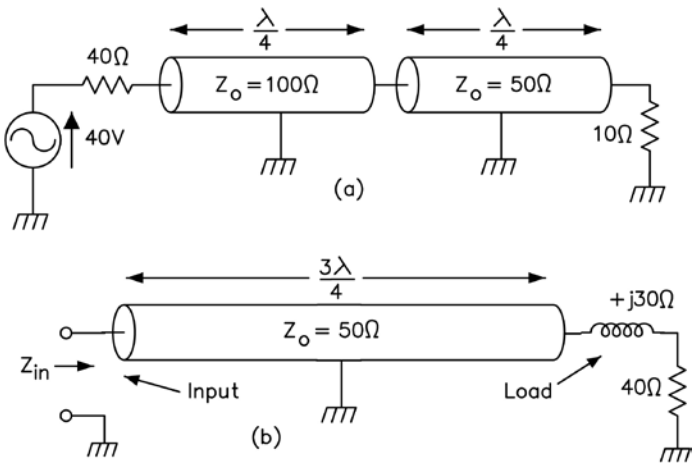

Figure 4: Top: Last month's problem. Bottom: This month's problem.

Eastfest September 2011

Report from Ken Duffy ZL4KD

While the rest of world were getting overexcited about the opening of some event in Auckland involving lots of foreign men running around chasing oval-shaped balls, the serious amateur radio operators of the South Island were decending on Ashburton for the inargual Eastfest event. Car and campervan loads appeared from the upper South Island and as far south as Dunedin. Many old aquaintances renewed and new friends made.

This event was organised by Jim ZL3ND and Tony ZL3HAM. It started from both having attended earlier Westfests and pondering the idea of why not run a similar event on the alternate year on the east coast. Boy; what a great selection of speakers they managed to get together. The Saturday was broken up into ten different presentation slots and following four more on the Sunday morning.

Topics ranged from satellites, DXing, sunspots, moonbounce, digimodes, QRP kits, HRD logging, APRS, 160m antennas to STSP repeaters.

For those of us whose CW has got a little rusty … well it wasn't really that flash at its best, were left musing over advice Mark ZL3AB was given about working CW special event stations "all you need to know is how to recognise your call-sign at reasonable speed" and be able to send "5nn tu" much amusement came from the floor as he justified the statement. One was left pondering "am I brave enough to try it?"

Like all good hams we like to see the goodies and we were not disappointed with Simon ZL4PLM who brought a 5m long 70cm beam to show what is possible in the home construction department and where to get those nice plastic boom to element blocks.

Also on display was the massive alloy heat sink and copper heat spreader for Starr ZL3CU's new 1.2kW 144MHz amplifer project underway along with the tiny cardboard template for the actual amplifier unit.

While I didn't go to the Saturday night dinner at the local Robbies Restaurant and Bar, the night went extremely well with over 40 enjoying the dining and creating a noise level exceeding 60db over S9.

On the Sunday afternoon, those who wished to, visited the Ashburton Aviation Museum, hosted by Les ZL3UX. They have an amazing array of aircraft, fixed and rotary, including a Harrier Jump jet, early model Piper Cherokee 140, and are awaiting the arrival of a RNZAF Skyhawk.

Preparations are already underway for Eastfest 2013 so keep the second weekend of September 2013 free and plan to attend. βi

(All photos courtesy Brian Holland ZL4WX)

Jim Nelson ZL3ND (co-organiser), Simon Lewis ZL4PLM (NZART councillor) and Tony Buckland ZL3HAM co-organiser.

The happy audience on Saturday.

NZART Councillor Stuart Watchman ZL2TW.

◀ *continued from page 17*

Robin ZL3TIG pointed out that we used to solve problems like this – and more complex ones – using the Smith Chart. He found a good source for this, and associated calculators on the web[7].

This month's problem

See figure 4(b). A lossless transmission line of length 3λ/4 having characteristic impedance 50Ω, is connected to a reactive load of having impedance $Z_L = 40 + j30\Omega$. Two questions:

a) What is the input impedance, *Zin*, seen at the input of the line?
b) What is the SWR on the line?

Additional Problem

In the early days of television in Auckland, a rumour went around that someone had produced a device that muted the sound during commercial breaks. Some claimed to have installed the device, and it worked! But shortly, the transmitter was modified so that the device no longer worked.

Questions: How did this device work, and what was the fix that disabled it? Did any readers actually see one in operation?

References

[1] See the video at <http://www.youtube.com/watch?v=WLZBl118Ads>
[2] Read about *LTspice* with tubes at <http://www.duncanamps.com/technical/ltspice.html>
[3] Read Maskelyne's book online at <http://sharpsandflats.com/>
[4] See the solar cycle references at <http://solarscience.msfc.nasa.gov/presentations.shtml>
[5] See the *"New Scientist"* article at <http://www.newscientist.com/article/mg20627640.800-whats-wrong-with-the-sun.html>
[6] See the problem solution at <http://www.qsl.net/zl1an/index.html>
[7] See the Smith Chart at <http://www.fritz.dellsperger.net/>

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

In this column I'll review some interesting new VFO options for Softrock and MEPT applications, and I will give you a brief introduction to RF identification tags, since they use some interesting digital techniques.

Frequency Synthesisers

Things have progressed a long way from the days of primitive VFO or crystal-controlled rigs, and even way beyond the first simple PLL designs, the Wadley Loop and Huff & Puff VFOs for frequency control. The latest designs tend to be either (a) Direct Digital Synthesis (DDS), or (b) Fractional-N PLL Synthesis.

The DDS synthesiser reconstructs a sine wave directly by sampling a table of sine values, converting the result to an analogue voltage, then applying a reconstruction filter (special low pass filter) to restore a sinusoidal waveform and eliminate the sampling frequency and other unwanted components such as harmonics and aliases.

The early DDS synthesisers were rather limited in performance by the resolution (number of bits) in the digital to analogue (D-A) conversion, and by the clock speed, which limited the upper frequency and also the frequency resolution. Poor D-A performance lead to unwanted spurious products. Now, however, sampling rates can be easily over 200MHz, and although this means the chip draws a lot of current, the output frequencies can be 50MHz or more. With the latest chips having 48-bit maths and 24-bit D-A, the spurious behaviour has also much improved.

One of the features of a DDS approach is that frequency resolution can be very small – 0.01Hz being not uncommon, which means the device can appear to tune smoothly just like an analogue VFO. Another feature is very wide frequency range (going up from DC), with instant frequency switching and smoothly changing carrier phase at the frequency change, meaning minimal switching sidebands when the VFO is tuned or keyed (FSK or MFSK).

PLL synthesisers have been around a long time, and essentially use a low frequency reference and phase detector to lock a high frequency VFO. A presettable divider divides the VFO frequency down, so when the loop is locked the VFO runs at a multiple of the low frequency loop reference frequency, multiplied by the division ratio in the divider. At HF, the performance was quite limited unless a complex multi-loop approach was used. Hence most commercial rigs over the last 20 years have used either a mix of VFO and large step synthesiser (e.g. Kenwood TS120S), dual or triple synthesisers with multiple mixers (e.g. Kenwood TS-430S), or even a mix of low frequency DDS and large step PLL synthesisers, common in more recent HF transceivers. Fortunately with multiple conversion designs, this wasn't a major imposition.

With the introduction of the Fractional-N synthesiser, this has all changed. Instead of having a high loop frequency and poor step size, we can now have a high loop frequency and small step size, since the Fractional-N is not limited to making integer frequency steps. How is this magic achieved? Rather than using a fixed loop reference frequency and fixed (for a given operating frequency) divider, in the latest chips these division ratios are changed dynamically. For example, with a reference frequency of 100kHz and a division of 35, the VFO might operate at 3.5MHz, and with a division ratio of 36, at 3.6MHz. If however the division ratio rapidly switched between 35 and 36, with a mean division of 35.5, the lock frequency would be 3.55MHz, or any other frequency in between, depending on the time spent at each division ratio!

That's a simplistic view, and a simple trick like that described would lead to a signal with terrible sidebands, both at 100kHz and at the division ratio switching rate. What has happened recently is that very clever logic (the details remain largely secret) has allowed the Fractional-N synthesiser to give very good phase noise performance, rivalling the PLL and approaching that of crystal-locked sources. These recent Fractional-N chips provide both very wide frequency range (e.g. 4MHz to 200MHz), lower power consumption than the DDS types, and sufficiently small step sizes. The spurious and phase noise is also now very good, although frequency switching is not phase continuous, so can have 'clicks'.

Now that we know a little about the common synthesiser topologies, we're ready to review two of the latest kits.

DG8SAQ QRP2000

This little kit, intended for use with a Softrock receiver, is I think my favourite[1]. The synthesiser uses the Si570 Fractional-N synthesiser chip, which includes a built-in crystal oscillator reference. The kit is controlled by a small micro, which allows 1Hz steps from 3.5MHz to 260MHz (there's also a version which goes to 900MHz). The nicest feature of this kit is that it is powered and controlled by a USB computer connection. The software provided by Tom DG8SAQ (Figure 1) allows easy frequency changing, and the kit is also compatible with several programs intended for Softrock receiver control.

To further increase it's usefulness, I negotiated with Tom some changes to the software, which allows the synthesiser to be controlled by a 'script', a series of letters and numbers which define a pattern – in other words allows it to operate as a MEPT device. It uses the standard 0-9 and A-F definition of 16 frequencies I use with other synthesisers.

In this screenshot (Figure 2) you can see a graphical interpretation of the transmitted pattern, and also the text of the script from which it is generated. On this screen you set the keying speed, frequency spacing and the operating frequency when

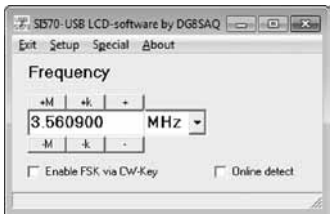

Figure 1. The DG8SAQ main frequency control screen.

the transmitter is 'off' (key up). If you set an impossibly high frequency for the following transmitter (here you see 200MHz!), it works as you might expect. You can't set 0Hz as the 'off' frequency, since the Si570 chip cannot do this.

When I built my version, I also added a divide by 32 chip, which gave me two frequency ranges; 3.5MHz to 260MHz, and 110kHz to 4MHz, so it gives continuous coverage over the whole LF–VHF range. The software allows for the divide by 32 factor to be included, so the frequency readout and MEPT step size are scaled exactly as expected.

I built the kit in a small diecast box, and later added a range switch and buffer amplifier, not shown in the picture (Figure 3). The kit is quite small, using surface mount components, but was remarkably simple to assemble and get going. There are no controls and no display, being completely remote controlled via the USB link. Used with my little netbook computer, it makes a great portable signal source.

N3ZI DDS-2

This kit uses a DDS device, and is rather better than some I've built in the past. The DDS chip is the only surface mount component, and it's preinstalled. The kit operates from 0 to 30MHz in 0.1Hz steps, using an 80MHz reference oscillator. In addition to a control knob and LCD display, the DDS-2 has a serial communications link, so

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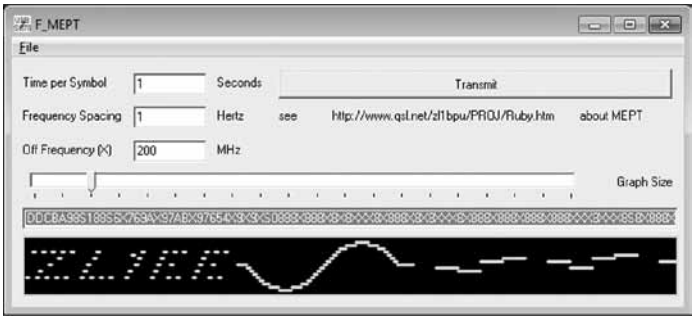

Figure 2. The Special MEPT function screen.

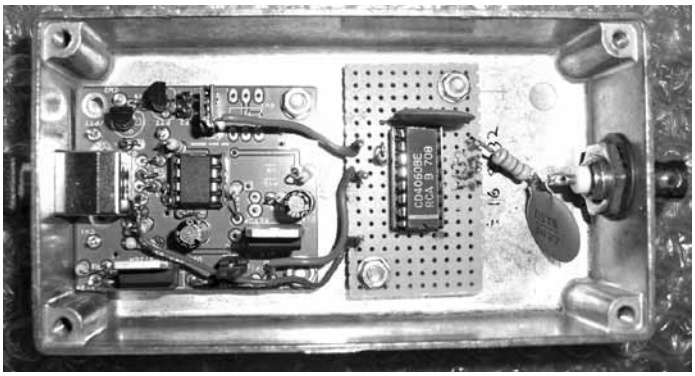

Figure 3. My DG8SAQ synthesiser (left) and divider stage (right).

you can computer control it. There are memory presets for each band, which along with other settings can be pre-loaded from the serial link or changed using the knob and display. Changing frequency to somewhere that's not pre-programmed is a bit slow and clumsy using the knob, but quick using the serial link. No software is supplied, as it is intended only for use with a 'dumb terminal'.

My DDS2 is built into a conductive plastic box. I also added a buffer amplifier, since the DDS output level is quite low (-8dBm). With the buffer the level is about +3dBm, and although it is good to 30MHz, it runs out of steam below 100kHz.

The latest version of this synthesiser will also work with a range of user-supplied LCD displays, and can use backlit displays as well. There is a user support group[2]. Figure 5 shows a screenshot of the software I wrote to control the N3ZI synthesiser.

The communications with this synthesiser is rather verbose, more suited to manual control with a dumb terminal, and there are as a result several problems when controlling it from a program. Delays have to be inserted to ensure that the micro is listening when you talk to it. As a result, at present the control program isn't totally reliable at QRSS3 speeds, as from time to time a command is missed and a symbol (say a dot) is missed or a previous symbol is extended.

Figure 6 shows both these synthesisers operating as QRSS3 MEPTs on 30m, using the software discussed. The results look pretty good, with only slight keying chirp and click on the lower trace. This is because the Si570 does not have continuous phase operation.

Synthesiser Stability

An interesting aspect of these synthesiser kits is that their stability is generally no better than a common crystal-controlled transmitter. While that's a lot better than a homebrew VFO rig, it's not good enough for modern narrow-band applications such as MEPT, especially on the higher bands.

There isn't a lot you can do with the Si570 chip, since the reference is built in. I have however discovered that the frequency versus temperature characteristic of this device tends to be reasonably flat over the frequency range 25°C to 35°C, so if you build it into a metal box to exclude draughts and maintain a high thermal time constant, stability should be adequate.

The N3ZI synthesiser uses a cheap external 80MHz XO reference, and I would imagine these are highly variable in performance. Mine had a turn-over point (frequency minimum) at about 30°C, but the behaviour was quite steep either side of that. As a result I ordered an 80MHz TCXO (temperature compensated crystal oscillator) with better than 1ppm performance over the whole operating range, to upgrade the unit. I discovered from Doug N3ZI that this synthesiser can be calibrated with any frequency reference within reason, so you could try whatever you have to hand, or perhaps multiply your shack 10MHz reference by eight and use that.

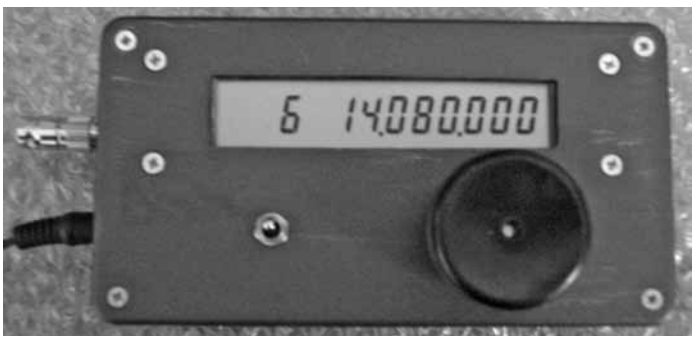

Figure 4. My N3ZI DDS2 synthesiser.

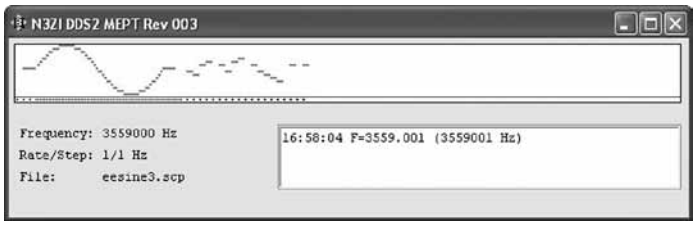

Figure 5. The N3ZI synthesiser control program.

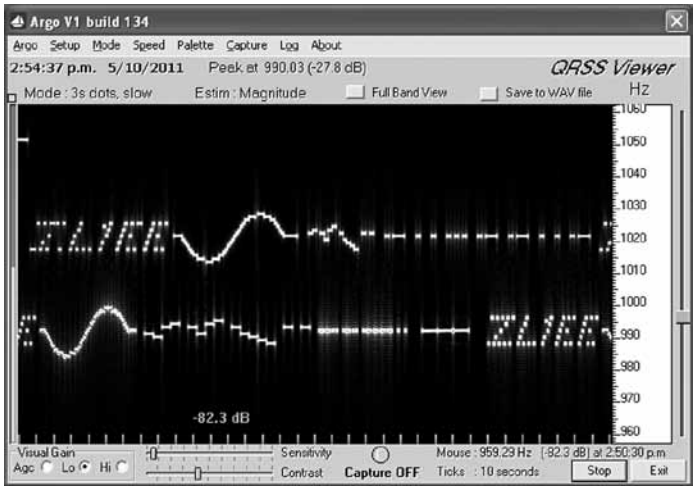

Figure 6. N3ZI (above) and DG8SAQ (below) QRSS3 operation.

Measuring Temperature Stability

What, you don't have a high performance temperature controlled chamber in the shack? Well, never mind, nor do I, but I can show you how to make reasonably good performance measurements with simple equipment. As a temperature chamber, I use a Peltier drinks cooler (DSE M4500), which is big enough to hold six cans, or one small electronics project. Mine operates by heating or cooling from about 0°C to 60°C without external help. I'd not suggest going much higher in temperature, but you can certainly extend the lower end. One way is to operate the unit in your fridge, which should get it down to -20°C, but an even simpler way is to slip a pre-frozen cooler pad inside the box for a while.

There are lots of tricks involved in getting good thermal measurements in any chamber, and experience makes quite a difference. For example, don't try to achieve rates of change of temperature greater than 1°C/minute, or you will find extreme hysteresis (different results with increasing and decreasing temperature) due to the thermal mass of the chamber and the device under test. If not in a sealed box, you should place the electronics in a sealed plastic bag to keep moisture from condensing on the unit. Pay great attention to where you attach the temperature sensor. I use a low mass Silicon sensor with a digital voltmeter with temperature range.

Of course to make any sort of meaningful frequency vs. temperature measurements you need a stable reference for the frequency counter. I would suggest at least a good OCXO, since you are looking for effects smaller than 1ppm (one part per million, 10Hz at 10MHz). I use a GPS Disciplined Reference, and because it is external to the counter, I operate it in Frequency Ratio mode. Every minute I log time, temperature and frequency directly into a spreadsheet, which calculates the rate of temperature change for me, so I know how much heat or cool to add. The easiest way to do this is to use a variable DC power supply to power the cooler. It pays to take a packed lunch, as these tests can take some time!

IARU – International Amateur Radio Union

Liaision Officer: John Lochhead ZL4QS
Liaision: Terry Carrell ZL3QL
Stuart Watchman ZL2TW, Peter Lake ZL2AZ

Since my last item in *Break-In* a few things have been happening which will be of interest to members.

In September Council approved a recommendation from the NZART IARU Liaison committee supporting Don Wallace ZL2TLL NZART's Administration Liaison Officer to be a part of New Zealand's Administration team to attend WRC-12 in Geneva early in the new Year. Following on from this Council approved the funding of Don's attendance to WRC-12 in Geneva.

The Committee is now moving to prepare for the IARU Region 3 Triennial Conference to be held in Ho Chi Min City in October 2012. The committee welcomes any input to suitable papers that NZART can present to the Conference.

John Lochhead ZL4QS
NZART IARU Liaison Officer

Next deadline for copy is
10 January

A Word from the Chairman of IARU Region 3 Michael Owen VK3KI

Eighth IARU Region 3 ARDF Championships – a report from Jack Bramham VK3WWW

Over the last 18 months or so a dedicated group of volunteers had been working in preparation to hold the eighth IARU Region 3 ARDF (Amateur Radio Direction Finding) Championships in Australia. Host society was the WIA and the event was organised by members of the Victorian ARDF Group.

Organising an event of this magnitude is no easy task. Conducting the actual competition is the easy bit. It is all of the other things like international correspondence, international teams local transport, meals and accommodation for 130+ and many other things. Over 50 volunteers were required so each of the events went off without a hitch. As WIA ARDF Coordinator I must thank all of them who gave up their time to assist with the event. Not all of the volunteers came from the amateur ranks. Many were recruited from the orienteering side of the sport. I would also like to thank Orienteering Victoria and the many orienteering clubs that loaned infrastructure for this event.

Participants for this event were made up of Australia (WIA) 19, China (CRSA) 34, Japan (JARL) 31, Kazakhstan (KFRR) 1, Korea (KARL) 6, Malaysia (MARTS) 2 and USA (ARRL) 3 totalling 96 competitors. Added to the competitors list there were team officials, trainers and international referees. So, as you can see it is really a major event for us here in VK.

Weather for all five days was really fine with the only bad patch being the Tuesday morning just before the 80m event when the heavens opened dampening the course, referees and the team setting up the infrastructure for this event. By the time the competitors arrived at the start location the weather had improved to a point where the event was held and no more rain fell on the course.

Friday 23 September was arrival and registration day, some international teams had arrived early and had been touring VK3. Teams started to arrive at the Blue Light Camp, Maldon around 14:00. John VK3PZ and his team were very busy making sure all of the information for each of the team members was correct and Ewen VK3OW made sure all had a place to sleep. Registrations continued well into the night with the last bus arriving about 22:00.

By Saturday morning most had settled in well and after breakfast everyone was loaded onto a bus to attend the Model Event. This event is for competitors to get used to our local weather and bush conditions and also to test out their equipment by DF-ing up to 10 transmitters (5 x 2m, 5 x 80m) set in a state forest with a real map.

Following the Model Event competitors were invited to participate in a Street-O and Fox-O event around the local streets of Maldon. For information about these events see <www.ardf.org.au> where you can find an explanation for all sorts of

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RFID Techniques

You will read elsewhere that there is a proposal to increase the permissible field strength for RRD (Restricted Radiation Devices) in the region 119 – 135kHz by as much as 23dB. I don't believe this will have a serious impact on our use of the 2200m band (130 – 190kHz), for a number of reasons that I won't go into here.

However, I thought you might be interested to know something about what RRD devices are used in this band. Most of them are used for Radio Frequency Identification (RFID). I'm sure you know about the 'chips' used in dogs and other companion animals. This is one type of RFID tag. There are others used in fish, horses, cattle, sheep and other larger animals. In farm animals however, the most common type is the ear tag, because these can be larger, are easier to change, can carry a physical ID (even a bar code) and have better range.

The most common RFID tags are the two types defined by the ISO 11784 standard[3]. The two types are quite different in operation, and have various advantages. One type is full duplex (FDX-B), where the tag transmits while the reader is transmitting, while the other is half duplex (HDX), and transmits only once the reader has stopped transmitting. The ISO reader is designed to pulse on and off, listen while transmitting, and then listen with a different receiving technique when the transmitter is off. The common factor is that the tag receives its operating energy by rectifying the reader's transmitted field.

The reader transmitter is a CW (typically Class D or E) device operating at about 10W, and drives a resonant antenna. The idea is to generate a large magnetic field, and lose as little power as possible through radiation. The coupling mechanism to the tag is inductive, like an inefficient transformer. The tag has a low-Q parallel resonant tuned circuit, air wound fine wire coils in the bigger tags, ferrite bobbins in the smaller ones. The 'chip' sits across the coil, and often forms the only capacitance across the coil.

The HDX tags are quite straightforward; the received energy is rectified, charges up a capacitor to run the chip, and once the field disappears, the chip triggers a tiny FSK transmitter on about the same frequency, which is coupled to the coil and transmits a fixed serial number message several times (until the capacitor has discharged).

The FDX technique is very cunning, as the tag doesn't transmit at all; it simply changes the amount of load it places on the coil. The serial number message switches on and off a resistor, which loads the tag's coil and thus the reader's antenna – this tiny change can be read as a change in voltage, since in effect the antenna impedance is being modulated. As this is done while the reader's transmitter is running, you can imagine the transmitter signal needs to be very clean.

Next time I'll talk a little bit about some of the modulation and signal processing techniques used in RFID tags and readers; they have a lot in common with Amateur digital modes, and it's not surprising that some of the best RFID developers have an Amateur Radio background!

Final Finals

There have been some good openings on 10m lately. It's worth firing up WSPR to see what's going on. I've seen many European stations at quite good strength appear at around sunrise and sunset, plus plenty from the Americas and Asia. 30m MEPT is also doing well into Europe and the US East Coast.

The Digital Modes net continues on Friday evenings at 8.30pm on 3550kHz LSB. We are at present making a determined effort to chat less and air a wide range of digital modes so that listeners can become familiar with receiving them and assessing their effectiveness.

References

[1] <sdr-kits.net/QRP2000_Description.html>
[2] <groups.yahoo.com/group/N3ZI_kits/>
[3] <www.rfidjournal.com/article/print/1335>

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Orienteering and ARDF type events.

Saturday was a busy day. After the local events it was off to the opening ceremony where both Michael Owen VK3KI (IARU Region 3 Chairman and WIA President) and Yoshio Arisaka JA1HQG (IARU Region 3 ARDF Chairman) welcomed everyone. After the opening ceremony there was an opportunity to take a group photo with all of the teams wearing their country kit.

Sunday 25 September was the first event. This event was on the 2m band, and until this time most of the competitors were very tense. That evening organisers put on a DVD night, showing a few local ham radio-related videos. One of these was from the Melbourne Foxhunt recorded by a Norwegian film crew. This confused a few of them trying to work out which language was being spoken!

Monday 26 September was a rest day but, not really. Competitors and officials met at the Maldon station in preparation for a vintage steam train trip to Castlemaine. From there they were then taken by bus to Bendigo and after an "Aussie BBQ" lunch they headed underground for a tour of the Central Deborah Gold Mine.

After the 80m event everyone headed off to the Baringhup Community Hall, some 10 km from Maldon, for the closing ceremony banquet and medal presentations. Michael Owen VK3KI and Robert Broomhead VK3DN presented all of the medals gained during the two competitions and Dianne Shalders VK3FVXN presented the awards for the Combo event. Medals were not presented for all of the age categories but to give you an idea on how many there can be they are as follows: W19, W21, W35, W45, W55, W65, M19, M21, M35, M45, M55, M65. With the exception of the 19 category which is actually up to the age of 21, all of the other categories are grouped in ten year segments. So, you really are only competing against competitors very close to your own age. There will be a video DVD of the event available soon. For more information check <www.r3.ardf.org.au>.

APG 2012-5 Conference Preparatory Group Meeting

Directors Shizuo Endo JE1MUI and Peter Lake ZL2AZ recently attended the fifth meeting of the Asia Pacific Telecommunity (APT) Conference Preparatory Group for WRC-2012 (APG 2012 – 5); held in Busan, Republic of Korea, Monday 29 August to 3 September 2011. This fifth APG meeting was the last of a series of meetings of administrations in Region 3 for WRC-12.

Also participating were Ken Yamamoto JA1CJP, Secretary of IARU Region 3, a member of the Japanese delegation nominated by JARL and Dale Hughes VK1DSH a member of the Australian delegation nominated by the WIA.

IARU Region 3 submitted an information document APG2012-5/INF-04 to the conference which mainly covered our Region 3 position on agenda item 1.23 for WRC-2012. Agenda Item 1.23 is "to consider an allocation of about 15 kHz in parts of the band 415-526.5 kHz to the amateur service on a secondary basis, taking into account the need to protect existing services."

At the meeting, we had four input documents supporting the allocation on Agenda Item 1.23 from Australia, Bangladesh, Japan and New Zealand and an information report from Australia on experimental activities undertaken for agenda item 1.23. At the meeting, the preliminary APT Common Proposal (PACP) for this agenda was adopted and it was approved that the PACP is circulated to all APT members to seek a vote to make the PACP into an APT Common Proposal (ACP). Regarding this issue, please be reminded that the Region 3 Secretary has already sent a Circular (No. G/06/11T) to each society on 20 September 2011.

WRC-12 – Region 3 Preparations

To continue with our information on this important event, WRC-12, which will be held in Geneva from 23 January – 17 February 2012, will review the international treaty that governs Radiocommunication – the ITU Radio Regulations <http://www.itu.int/publ/R-REG-RR-2008/en>.

The WRC-12 conference will be preceded by the Radiocommunication Assembly (RA-12), also to be held in Geneva, 16-20 January 2012. As a prelude the APT preparatory meeting was held in Busan, Korea.

Earthquake in Sikkim

The 2011 Sikkim earthquake, also known as the 2011 Himalayan earthquake, was a magnitude 6.9 (Mw) earthquake centered within the Kanchenjunga Conservation area, near the border of Nepal and the Indian state of Sikkim, at 18:10 IST (12:40 UTC) on Sunday, 18 September 2011 The earthquake was felt across northeastern India, Nepal, Bhutan, Bangladesh and southern Tibet.

At least 111 people were killed in the earthquake. Most of the deaths occurred in Sikkim, with reports of fatalities in and near Singtam in the East Sikkim district. Several buildings collapsed in Gangtok. Eleven are reported dead in Nepal, including three killed when a wall collapsed in the British Embassy in Kathmandu. Elsewhere, structural damage occurred in Bangladesh, Bhutan, and across Tibet; another seven fatalities were confirmed in the latter region.

The north eastern parts of India does not have a large population of radio amateurs, but hams from the West Bengal region offered their assistance to the authorities

Seanet 2011; a final reminder

The Seanet 2011 will be hosted by BDARA, Brunei Darussalam Amateur Radio Association at the Center Point Hotel between 17-21 November 2011. Well over 50 registrations have already been received from various parts of the world. Full details at <http://seanet2011.com/>.

2012 International YL Meet; a reminder

This meeting is now scheduled from 3-9 May 2012 at Adelaide. Full details are available at <http://ylinternational2012.com/index.php?p=1_6_Adelaide-Meet>.

The Region 3 website go to: <http://www.iaru-r3.org>. Editor: Gopal Madhavan VU2GMN, Director IARU Region3 E-mail: <vu2gmn@gmail.com>.

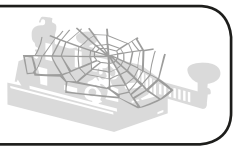
The statements or opinions in this newsletter do not, unless otherwise stated, necessarily reflect the views of IARU Region 3, the Directors or the Secretariat. Items from this Newsletter may be freely copied for publication by Member Societies of IARU.

New Members

Name	*City Town*	*Branch*	*Call-sign*
BA Lagerstedt	Waipawa	13	ZL2BFO
P Van Beyere Berge Henegouw	Christchurch	5	ZL3PMB
Rose Jenks	Kirwee	5	ZL3REJ
John Kirton	Napier	25	ZL2ALK
B Larkin	Inglewood	27	ZL2VZ
D Sullivan	Otane	13	ZL2OK
R Hall	Stratford	27	ZL2RSH
M G McGovern	Rotorua	83	ZL1MGA
JM Elvy	Auckland	2	ZL2BAY
M J Gousmett	Rangiora	68	Nil
B Wilton	Christchurch	5	ZL3HUR
Darren Sharland	Palmerston North	20	ZL2DAZ
Jason Watson	Palmerston North	20	ZL2JSN
Matthew Donoghue	Palmerston North	20	ZL2PR
Paul Kaufmann	Puhoi	29	ZL1PAK
David Wein	Auckland	29	ZL1DMW
N Runge	Auckland	2	ZL1OLE
S Dolan	Cambridge	4	ZL4KL
R T Dean	Hastings	13	ZL2VNZ
K Cairns	Wellington	50	ZL1TWO
M J Bettridge	Westport	62	ZL3DU
G Rumbal	Auckland	29	ZL2GJ
M Upton	Auckland	29	ZL1MPU

Silent Keys

The Association deeply regrets to record the death of the following members and extends its sympathy to the bereaved.



Silent Keys: guidelines to contributors

Contributors are requested to limit their obituaries to between 200-400 words. Content should focus mainly on the amateur radio activities of the deceased. Normally photographs cannot be included.

Murray James Evans ZL1SZ 1941-2011

Born in Ekatahuna on 27 August 1941. Murray's interest in amateur radio started at an early age with the encouragement of his father, Jim ZL2QI, himself a very enthusiastic amateur operating in the Wairarapa area in the days when the equipment used was mainly 'home brew'.

Murray obtained his Amateur Radio License in the early 1960's and was issued with the call-sign ZL2AIH. Like his father he also became an avid 'Ham' spending many hours working various countries around the world. The certificates and trophies he was awarded in his lifetime are a testimonial to his achievements and dedication to his hobby over a long period of time. I believe he had confirmation of having worked in excess of 300 countries.

A lifetime career in the electrical industry saw a move for Murray and his young family to Opotiki in the Bay of Plenty in April 1976 where he was allocated the call-sign ZL1SZ. Murray along with other amateurs from the Opotiki area travelled regularly to Whakatane to attend the monthly meetings held at that time in private homes until a clubhouse was eventually built.

Relocating to Whakatane in 1977 saw Murray become more involved within Branch51 Eastern Bay of Plenty where he became a permanent identity serving on the committee and taking on the responsibilities of either Secretary, Treasurer, Convenor for the 1988 NZART Conference which was held in Whakatane, and at the time of his death in May this year he was the 'ongoing' President. He held a Private Pilot's License, was actively involved in the Volunteer Fire Service, and a long standing member of the local Lions Club. Murray had a great work ethic in many organisations within our community.

Murray and his wife Joyce opened and operated a local retail lighting and contracting business in Whakatane from the late 1980's and both had only recently retired just prior to his death .

I will remember Murray for his dedication, attention to detail, his sincerity and friendship. Lastly, who could forget that 'engaging smile'. To his wife Joyce and family we extend sincere sympathy from the members of Branch51.

Bevan Schwass ZL1MJ
Secretary EBOP Branch51
NZART

Eion Gibson ZL3AG; 1951-2011

It is with great sadness I report that a long time and very good friend Eion Gibson ZL3AG became a silent key on Tuesday 26 October 2011.

First Licenced September 1966 at age of 15. Previous call-signs included ZL3TDI, ZL3HU, ZL4AR, ZL2SL, ZL3MN lastly ZL3AG. I first met Eion at the South Canterbury Amateur Radio Club which I joined around the time I received my amateur radio call-sign. Eion was a talented person who was a very helpful and active amateur radio operator. Over the years Eion tested and "peaked up" many local hams' and various local 2m repeaters. Eion enjoyed HF. He never had an HF beam; but successfully used homemade wire antennas, which were of a special interest to him and he was particularly proud of his G5RV complete with his baluns. A box where the ribbon section terminated contained relays that were controlled from the shack which controlled tuning coils etc. This enabled the antenna to be more versatile and could be used on 160m etc. Eion also constructed appropriate antenna baluns for himself and others and would help other hams to erect their pole and towers etc His own shack was neat, very ordered and uncluttered.

Not only did Eion help individual amateur radio operators, he was also responsible for the design/development of the Newton low pass filter. He also wound and identified the coils which were then used by club members at the club rooms for assembling the filters. Many were sold and an article in the *Electronics Australia* magazine featured the filter and how to build it. During the last 13 years or so Eion became very active in establishing/upgrading amateur radio repeaters.

Eion was involved with radio at his place of work which included BCNZ, Post Office radio department, Tait Radio Commutations and lately he was employed by the New Zealand Police for the installation of their new radio system.

We extend our sympathy to Eion's family and partner.

Starr Moffatt ZL3CU

Eion joined Police ICT as an RF Engineer in January 2009. His appointment provided the radio development team with a wealth of RF knowledge and experience for the transition from analogue to digital radio. Eion was instrumental in the frequency planning and RF equipment selection for the Auckland and Canterbury regions and hosted an RF master class/workshop for the team. Since the completion of these regions he went on to provide a national frequency plan for the future completion of the digital network. Eion provided guidance and support to the Police ICT engineering team and will be remembered as a gentleman and an exceptional engineer.

Stuart Colsell, BEng Hons,
Ph.D, MIEEE
Technical Consultant,
Radio Development Group,
NZ Police

FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

Final recommendations to Council

The Manawatu ARC, Branch 20, has applied for an APRS Digipeater at Mataroa, located at TOPO50 BK35 346016, with a transmit and receive frequency of 144.575 MHz.

Reefton-Buller Branch 62 has applied for a 2-metre repeater at Millerton, located at Topo50 BR21 049901. The repeater transmit frequency will be 146.750 MHz and receive frequency 146.150 MHz.

Reefton-Buller Branch 62 has applied for a 2-metre APRS digipeater at Denniston, located at Topo50 BR21 003782. The digipeater transmit and receive frequency will be 144.575 MHz.

Reefton-Buller Branch 62 has applied for a National System UHF Link Station (ULS) at Denniston, located at Topo50 BR21 003782, to link to the Murchison National System station. The ULS transmit frequency will be 439.950 MHz and receive frequency 434.950 MHz.

Reefton-Buller Branch 62 has applied for a National System Repeater at Denniston, located at Topo50 BR21 003782. The repeater transmit frequency will be 439.975 MHz and receive frequency 434.975 MHz, in accordance with the National System Frequency Plan.

The Auckland VHF Group, Branch 66, has applied for a 850 repeater at North Head, located at TOPO50 BA32 616227. The repeater transmit frequency will be 438.500 MHz and its receive frequency will be 433.500 MHz.

ZL3BCC has applied for a simplex VOIP station at Innes Road, Christchurch, located at TOPO50 BX24 709.79 838.37. The transmit and receive frequency will be 432.700 MHz, in accordance with the bandplan.

Comments and Applications

Please send your comments and suggestions on the above matters, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>.

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://www.nzart.org.nz/fmtag/index.html>

Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>.

Longer Wavelengths

Con Wassilieff ZL2AFP
<zl2afp@nzart.org.nz>

This column describes two measuring instruments that are indispensable for serious experimentation at the lower frequencies. To be able to determine the power going into the antenna, it is necessary to know two things: the antenna impedance, in particular the resistive part; and either the voltage or the current applied to the antenna.

RF Ammeters for lower frequencies

There are basically two types of RF current measuring meters: thermocouple ammeters, and current transformer ammeters. Thermocouple ammeters are now scarce items and, if you find a good one, it is better to use it for calibration purposes rather than "live" measurements. The RF voltage on most LF antennas can run into kilovolts and these can easily destroy a thermocouple ammeter. Been there; done that!

Current Transformer RF ammeters are easily made and calibrated, and relatively immune to high voltage "flash-overs" (at least I have been lucky so far). Current transformers are usually made with high permeability ferrite toroid cores with a one turn primary and a large number of turns on the secondary, and a resistive termination of typically 10's of ohms. The voltage across the terminating resistor is measured with a simple half-wave rectifier and filter. This limits the ammeter to measuring sine waves only, which is not a problem in practice as this is what we should have on the antenna anyway!

For the meter to have minimal effect on the antenna circuit its reflected resistance back on the circuit should be a small percentage of the antenna resistance. In most amateur LF/MF applications using a vertical Marconi type antenna, this is at best 10 ohms or more, and so the meter should "look" like a resistance of less than say, 0.1 ohms. A transmitting loop on the other hand will have a much lower resistance, in the order of ohms and so the meter needs to be designed for a much lower reflected resistance.

The choice of load resistance and the transformer turns ratio is a compromise. The RF voltage across the terminating resistance needs to be high enough to drive a rectifier so that rectifier "knee" does not result in non-linear readings over the entire meter range, and the resistance reflected back into the antenna must be low. The reactance of the transformer secondary winding also must be considerably higher than the resistive load at the frequency of interest. Typically the resistance is generally in the 10's of ohms and secondary windings in the 10's of turns.

The circuit in figure 1 is my compromise. The toroid core was supplied ready-wound by Bob ZL2CA and the rest of the meter circuit was designed around this. The terminating resistance is 33 ohms, which results in a reflected resistance of 33/(26 x 26) = 0.05 ohms. Taking into account the voltage drop across the Germanium diode (silicon diodes are not recommended due to diode "knee" issues) and the 0-500μA meter internal resistance of 260 ohms, the series resistance of 12k gives a convenient full scale reading of 5A. The reading is increasingly non-linear below 1A due to the non-linear characteristics of the diode at lower voltages. However, if you need to measure less than 1A of RF current, a two- or even three-turn primary can be used. This will increase the resistance reflected back to the antenna circuit from 0.05 ohms to 0.2 and 0.45 ohms respectively, so this trick must be used with caution unless the antenna resistance is already high (which it certainly is at my QTH).

Note that just bringing the antenna lead through the core results in a one-turn primary (the return path is via the earth system so it is a closed loop). If you loop it around the core once more, it will be a two-turn primary and so on. Figure 2 is a photo of the back end of my current transformer ammeter. The core was large enough to take a coax core with a grommet to keep high voltages away from the secondary.

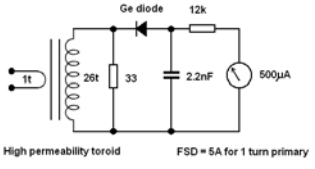


Figure 1. Current transformer RF ammeter circuit.

I have compared my current transformer meter against the reading of my 0-5A Weston thermocouple ammeter and agreement is within 2% or thereabouts over the LF/MF range, at least at currents greater than 1A, below which the thermocouple ammeter also suffers from a compressed scale. It may be that both meters are systematically wrong but I am in the right "ball park", as they say!

Antenna impedance bridge for low frequencies

Having built an impedance bridge I wondered how I ever managed without one in the past. In order to know how much inductance is required to resonate an electrically short vertical antenna, it is necessary to know the capacitance of the antenna, or at least the capacitive reactance. In order to know how much power is going into the antenna it is necessary to know the RF resistance of the antenna, and the current (or voltage). Although the capacitance can be measured using a capacitance meter (many digital multimeters have a capacitance setting), the resistance can only be measured with a bridge. The antenna resistance usually increases with decreasing frequency so the resistance reading must be made at the frequency of interest.

In addition, experimentation at low frequencies involves winding your own inductors (for low pass filters etc), and measurement of inductance is useful (calculated inductance never seems to be as it should). The bridge described below does all of these things. There is never a free lunch though, and L, C and R can only be accurately measured under certain conditions. For example the bridge can only measure the net reactance. If the impedance is comprised of an inductive and capacitive component, the bridge will deliver a result that is the sum (or is it the difference?) of the two reactances. Fortunately for us, at lower frequencies even a large amateur antenna has a capacitive reactance that is greatly in excess of the inductive reactance. But in reality it does not matter, as we only need to know how much additional inductive reactance to add to cancel out the remaining capacitive reactance, and so the bridge is useful even at frequencies where the antenna has a significant inductive component.

Although I have calibrated my bridge in terms of an effective capacitance and a negative capacitance (ie the inductive part), this is a convenience in terms of dial calibration (saves having different ohms scales for different frequencies). It is easy enough to work out the reactance as $XC = 1/(2\varpi fC)$.

To measure inductance, it is necessary to include a known capacitance in series with the unknown inductance. Figure 3 shows the circuit of my bridge, together with the formula to work out the unknown inductance (this is an ideal task for a spread sheet). Rather than have

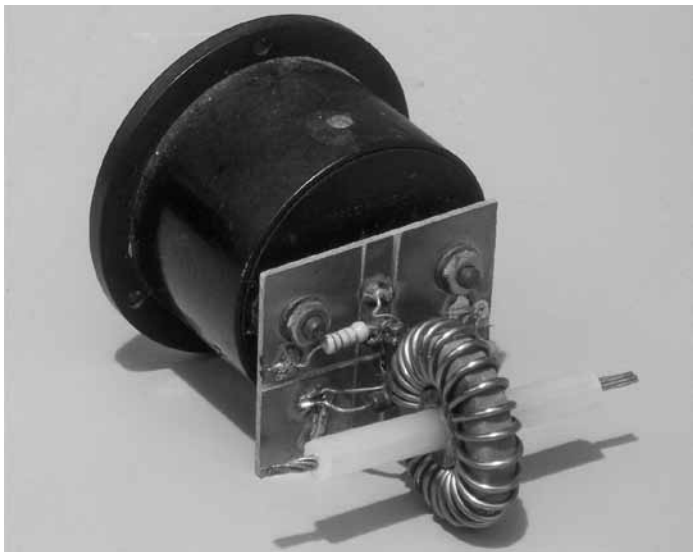


Figure 2. Current transformer RF ammeter.

+C and –C on the same scale, with zero reactance somewhere in the middle, I have doubled the range of the variable capacitor by including a capacitance in parallel with the main variable capacitor. The downside is that a switch is now required but this is a small price to pay for the added measurement range.

My bridge is a variation on the Noise Bridge described by Kelvin ZL3KB in the September 1998 *Break-In*[1], only without the noise generator. Instead I use an external sine generator (because I have one). The bridge is built into the remnants of an old Advance audio oscillator, as it had a nice variable capacitor and dial. All it required was a new dial face. Calibration is a matter of checking known capacitors, as described in Kelvin's article. A double-check on the –C calibration can be made using known inductors and the formula in figure 3.

Figure 4 shows the general arrangement of the interior. I include this photo of the (rather scruffy) innards to show the switched resistances R (you can see them on the left with a magnifying glass!) that I have used instead of a variable carbon potentiometer. I have had nothing but grief and woe with the scratchy wipers on carbon pots. Note that you cannot reliably use a wirewound pot as these have too much inductance and affect the accuracy of the readings.

I have instead used two multipole switches in series, one with 10 ohm resistors giving a range of 0 to 110 ohms (it was an 11-pole switch), and a "fine tune" switch with 1 ohm resistors. As I was only interested in antenna resistances of less then 100 ohms (your antenna is a serious worm-warmer if it has resistance higher than 100 ohms!). This gives a range of 0 to 110 ohms in 1-ohm steps.

Operation of the bridge is just a matter of adjusting C and R for a minimum reading at the output terminals. A receiver or selective level meter (SLM) can be used as long as it can be tuned to the lower frequencies of interest. My SLM is a Wandel and Goltermann SPM-6, which I also use as a receiver as it has been modified to have audio output.

Proposed changes that affect the 130 to 190 kHz Amateur Band

The MED is proposing to increase the power short range devices (SRD's) are allowed to use in the 9-190 kHz band. In particular, they are proposing a power increase of 23dB to 2 watts EIRP (effective isotropic radiated power) over the band 119–135 kHz–the top end of which overlaps the lower end of our 130 to 190 kHz Amateur Band. Full details of the proposal can found at the MED website[2].

The MED website states that there is growing demand for short range devices (SRDs) in the 9-190 kHz band. Some uses and applications include Radio Frequency Identification (RFID); car locks, alarms and immobilisers; wireless charging; and security systems.

SRD's in the 9-190 kHz band are currently permitted under a General User Radio Licence for Short Range Devices (GURL-SRD) with limitations on use and power (power is expressed in EIRP). The Ministry has recently been approached by stakeholders requesting that the power limits in the 9-190 kHz band be increased as they are lower than those mandated internationally, and are therefore restricting the types of equipment that can be used in New Zealand.

However, it is hard to see how a short range device will be able to generate that sort of power (2 W) without a big amplifier and a big antenna. Amateurs have great difficulty radiating even 1 watt at these frequencies and even this takes large antennas and 100's of watts to the antenna. My opinion is that in practice this is unlikely to have any detrimental effect upon our usage of the band. However, contrary opinions are always welcome in case I am horribly mistaken! NZART is proposing to put in a submission on this proposal so if you would like to contribute to this, please send an email to the NZART Administration Officer, (Don Wallace, ZL2TLL) at <nzart@wallace.gen.nz> expressing your interest and any views you have (positive or negative) on the MED's proposal.

Any individual submissions must be received by the MED by 5:00 pm, 14 December 2011.

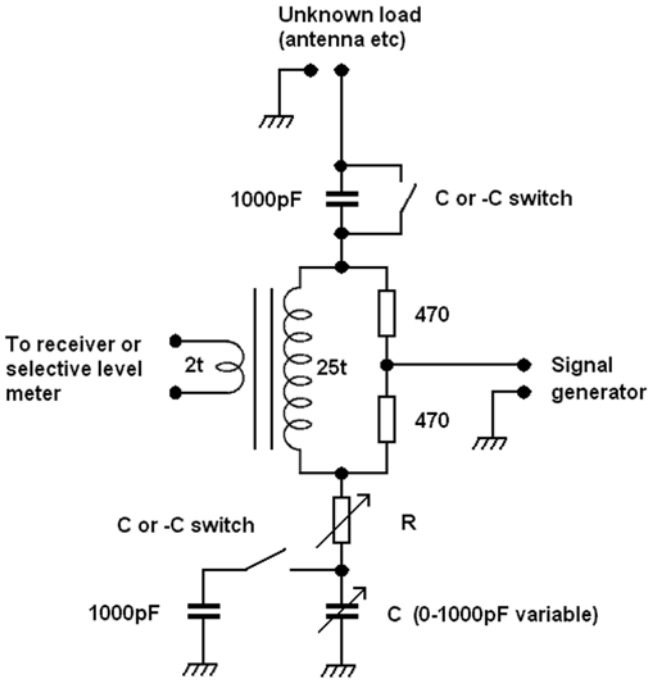


Figure 3. Impedance bridge circuit.

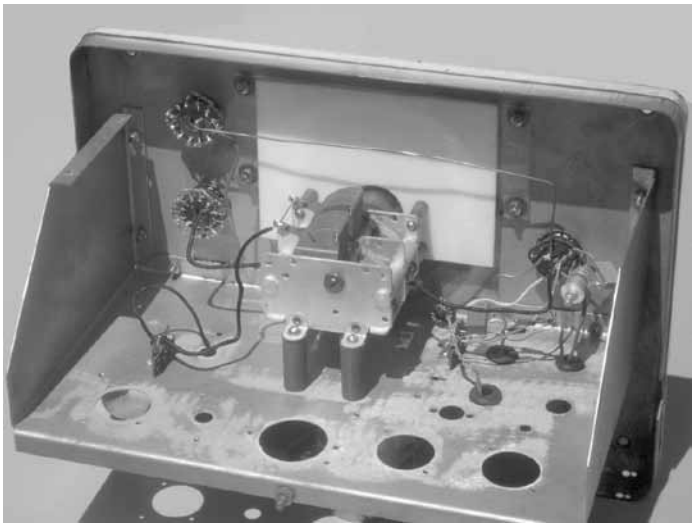


Figure 4. Interior of ZL2AFP impedance bridge.

600m net

Now that daylight saving has begun, the Thursday evening 600m net will meet fortnightly on odd Thursdays on 3666kHz at 8.30pm. Depending upon propagation conditions the net may go into recess over the December-January period.

References

[1] *"Take a look at the Noise Bridge"*, *Break-In* Sept 1998

[2] <http://www.rsm.govt.nz/cms/policy-and-planning/projects/proposed-power-increase-for-short-range-devices>

NZART Stolen Equipment Register

NZART Council has decided to discontinue the Stolen Equipment Register, effective immediately. All equipment which is stolen should be reported to your local Police Station.

VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

Well the spring months are upon us and have brought along a mix of good and bad weather. There has been varying levels of activity as highlighted in the sections below. It's also time to get prepared for the next VHF Field day this December along with the following DX weekend in February 2012.

6m Happenings

There has been a reasonable amount of activity on 6m with ZLTV being heard in JA with corresponding contacts by Bob ZL1RS on 21 October (UTC) to JA 1 and 2 areas. On 23 October (UTC) JA3EGE was reporting strong S9 signals from ZL TV again.

Bob (ZL1RS) reports on some of his activity to date.

6m opening in ZL – September 2011: Nil

6m openings in northern ZL – October 2011

05 October: KH6 (strong)
06 October: KH6 (weak)
12 October: W6 (weak)
20 October: W0, W6, W7 (weak)
21 October: BY, JA (strong)
22 October: BY (weak)
25 October: The MUF started to really rise at about 23:00 UTC (mid-day local time) with W6 and W7 stations reporting ZL TV video signals on 45.240 and 45.260 very strong. Propagation reached 6m by 23:20 UTC and hung in until 01:30 UTC (2:30pm local time). K6QXY was 59+ on SSB and a dozen or so others from the W6/W7 area were worked on SSB and CW. The K6FV/b beacon on 50.069 was up to S7 on the meter at times. The Niue ionosonde reading got close to 17 MHz during the opening indicating an MUF around 56MHz might have been possible (K6QXY reported ZL TV audio on 50.740 at around 00:30 UTC).
26 October: Nothing sustained into ZL but E51, A35 and FK8 have had a VERY strong F2 opening to North America and JA, and weaker openings to Central America, Caribbean, KH6 and China. VK4 stations in northern Queensland also worked the west coast of the USA with some strong signals. Short periods of this propagation were heard in ZL coming from USA stations calling the TX7M DXpedition on 50.108 and the other Pacific Islands. This may have been via meteor enhancements from the strong propagation to our north.

It is worth keeping an eye on the Niue ionosonde chart at <http://www.ips.gov.au/HF_Systems/1/2/1> as there seems to be 6m propagation into ZL most times when it hits 16MHz.

The Ionospheric map at <http://www.ips.gov.au/HF_Systems/6/5> is also a useful indication as 6m propagation often occurs when we get into the dark blue 9MHz region and close to the maroon 10MHz region; especially when the T Index Map <http://www.ips.gov.au/HF_Systems/1/6/1> shows ZL in the light blue area (>20 T units above the monthly T index). Note that the foF2 map figures are an estimate of the vertical incidence Critical Frequency and the MUF is much higher (some say 3.3 or more times the foF2). In addition we beam out to find an F2 layer reflection point that is perhaps 2000km away from ZL and the state of the ionosphere is quite different there than it is overhead. The map is also about an hour old so some "forecasting" is required.

Propagation "indicators" (signals actually heard in the last weeks):

33.000 BY/JA data
33.420 WQJW Sammanish, WA. Studio Link
33.520 US EMergency Services
33.900 US EMS (in Ohio)
35.000 BY radar
35.980 US 2-way radio (RTs)
40.670 "Sno Tel" data (W7?)
43.650 JA data
49.750 BY/UA0 video carriers

2m Activity

As the months get warmer, the activity seems to be rising a bit as well. Mid-September saw Nick ZL1IU having a great old time with a mix of VKs from VK2 and 4 with both CW and SSB contacts. Starr ZL3CU, Bob ZL3TY and Peter ZL4LV were also in the later part of September/early October on the WSJT, working across the pond to VK7MO.

On 20 October (UTC) the band was wide open to VK2 and 4 with strong signals into Nick ZL1IU both on 2m and 70cm and Steve ZL1TPH on 2m. Later on Ray ZL2TAL and Mark ZL2WHO are on the bandwagon as well working VK2.

On 21 October (UTC) more activity was had with some extremely good contacts from Ray ZL2TAL on 2m and 70cm with sigs hitting 57 on 70cm. Steve ZL1TPH, Dave ZL1AKW, Nick ZL1IU, Leith ZL1BCJ and Simon ZL1SWW were all in the mix with good 2m contacts into VK2.

23 October (UTC) Steve was hearing the Wellington Beacon. 24 October, Mark ZL2WHO worked Simon ZL4PLM in Christchurch at 445km with a 52 signal report.

When VK openings happen, it is most likely that you will hear and work the stalwarts of the VHF DXers such as Ross VK2DVZ, Steve VK2ZT, VK2AMS and VK4JMC.

Judicious watching of the Hepburn Tropospheric Prediction webpage is a good way to get an idea of what the band may do at any time. When optimal predictions are present, it's time to look for band indicators. One very useful one is ABN Ch5a, very noticeable on SSB at 138.276 Vision carrier and the corresponding 143.776 Sound carrier (the actual listed frequency is 138.25V and 143.75S). Other useful ones are pagers at 148.141, 148.239, 148.560, 146.612 148.637, 148.910, all in FM mode, most are vertically polarised but audible on horizontal, most of the time anyway. Also the FM broadcast band is a real good indicator as well.

Microwave Activity

October had the Microwave contest on the first and second of the month. This was a low key affair in the northern part but some fun was had by all those who participated. The main emphasis this time was to test 3.4GHz as this band is valuable in the sense that it is free of ISM interference and good distances can be obtained from this band. Access to this band has been made easier by the introduction of a 3.4GHz kit designed by VK3XPD that has great performance.

A team of three (ZL1TPH, ZL1BCJ and ZL1SWW), went out to Muriwai at 200 m ASL, on the west coast of Auckland on Sunday from around 10 am with numerous bands. The main purpose will be to test new equipment to two stations in Taranaki (275 km) on 3.4 GHz. At the Muriwai end, both Simon ZL1SWW and Stephen ZL1TPH had two separate 3.4 GHz stations side by side with 1.25 metre dishes and near 10 W TX power. Dish gain is at 30 dBi and so near 10 kW EIRP. RX noise figures are low enough to detect Sun noise. Ted, ZL2IP was also active with 30 dBi of dish gain and 16 W at the feed. Ray, ZL2TAL has upgraded his PA and is now running 5 W or so at the feed. Due to the weather, Ray stayed at home while Ted hit the hills in the pouring rain to try out the 3.4GHz.

From the scribe's point of view, these activity sessions are important from the fun standpoint as well as finding any deficiencies in the system. A side by side test with Stephen on 3.4GHz showed an S2 improvement over the scribe's gear. This highlights the careful attention needed in sourcing good connectors and feed line at the business end of the transverter. A measurement of the cabling that I took to the site revealed that there was 3.5dB loss at 5.7GHz in two sections of cable that amounted to about 1.2m long from

Stephen ZL1TPH and Simon's ZL1SWW 1.25m Dishes on 3.4GHz.

the feed point to the transverter. So much for just grabbing a cable at hand without measuring.

Stephen reports "On 3.4 GHz (or 9 cm band) the path distance worked was around 273 km short haul, under some not so desirable propagation conditions.

The LOS or true line of site component from the northern end was only 58 km to the sea horizon. From the southern end the LOS to sea horizon was 82 km which indicates around a 135 km distance of sea, or seawater mid path as the obstruction. (Not taking into consideration the 4/3 rule that is).

Simon ZL1SWW was parked alongside me with a separate standalone station on 3.4 GHz (with the same specs) and you will hear him also work Ted toward the end of the video. John ZL4JY was active on 3.4 GHz from Raglan.

Kevin ZL1UJG was also active on 3.4 GHz from Hamilton. No contact resulted to Hamilton, but excellent signals into John ZL4JY at Raglan on 3.4 GHz from both the Auckland and Taranaki stations.

On the 2 m band, 144 MHz contacts were to Dave ZL1AKW in Tauranga, Kevin ZL1UJG in Hamilton, and Ted ZL2IP in Taranaki and best DX goes to Mark ZL2WHO in the Palmerston, Pahiatua track area at 400 + km distance at S8. Leith ZL1BCJ provided and operated the 2 m station at our portable QTH.

Band conditions were flat, with no summer enhancement or tropo ducting. The paths worked on 3.4 GHz (273 km) and 2 metres (400 km +) would be considered 24/7 workable. Thanks to all those that came up on the air to promote 3.4 GHz band usage ahead, on 1-2 October 2011 NZART Microwave test."

John ZL4JY surprised us coming up on air on 2m from Raglan eager to try out his partly built 3.4GHz transverter. John adds "The LO is a single chip ADF4350 PLL/VCO chip and the down converter is a $60 commercial C band LNB from Trade Me®. I removed the DRO puck and substituted a connector for the LO input. So the RX chain was single IC VCO/PLL LO and with one FET in the LNA, a ring diode mixer, and an IF amp FET in the LNB.

-100 dBm at 3400 MHz = S9 on the Icom and with no input the

John ZL4JY testing his cardboard 3.4GHz receiver.

Icom reads about S2.

I didn't finish my 60cm offset feed dish arrangement but used an off the shelf 3.4 GHz panel. A coffee can with a probe may have been better.

The site was Woody Head just south of Raglan, one of the original WWII radar sites."

On another note, Kevin ZL1UJG advises that the Hamilton 2m and 23cm ZL1VHW beacons have been reinstalled at the original Central Hamilton location. The new frequencies are 144.260 MHz and 1296.260 MHz. Keying is FSK as before. Dave ZL1AKW has reported that he is hearing the 23cm beacon in Tauranga with a healthy S8 signal report. The 2m beacon is S9+.

The 70cm beacon is being rebuilt but when completed, will not be located in the central city location, alternative sites are being looked at.

Items from the past

Leading up to the last microwave contest, some discussion was had between people and an interesting bit of history surfaced in regard to early 3.4GHz contacts from various locations to achieve the 9cm ZL record.

Peter ZL2ARW recalls " Wow, time flies, it doesn't seem like 28 years since breaking the record on 6 March 1983. The gear I used was a homebrew SSB up-converter and down-converter from VHF Comms magazine. The up-converter used a GaAsFET mixer and amplifier chain with an output; about 40mW I think. The receiver used a homebrew GaAsFET preamp based on a C-Band satellite LNA feeding a GaAsFET mixer. The IF was on 2 m using an Icom IC-211. The antenna was a 1.2 m focal plane dish with a waveguide splash plate feed, waveguide to coax adapter and rotary type-N T/R relay. Contact was first made from further south at Maungatanwha and signals were so good that we decided to go to Te Paki the next day and again worked John ZL2AQE for the 547 km 9cm record."

Liaison and setup was by 4 x 11 element stacked Yagis on 70cm and a 4CX250 PA to get a basic alignment and once 70cm was established, a move up to 23cm was then done to get more pointing accuracy before swapping to 3.4 or 5.7 GHz.

NZART VHF distance records has the earliest terrestrial contact recorded on 1296 MHz in 1970. With recent enquiries amongst New Zealand amateurs, we have since revealed that there were other contacts made prior to this. We ask if any amateurs have any other recollections of contacts, or cross band contacts, equipment used etc on this band circa 1970 so that we can add to this past recollection and record this history ahead in VHF Scene. Please send any information to Steve zl1tph@nzart.org.nz.

Other Items

Quentin ZL1QF, who now resides in Brisbane, was back in town for the weekend and gave Simon ZL1SWW a ring to see what's been happening in ZL. He mentions that there has been quite a lot of activity in the VK4 area in the microwave region with regular activity days happening to test gear and get people out there doing things. Some activity has been revolving around tune up sessions. The tune up day allows microwave enthusiasts to bring their gear along, for comparisons, tests and tweaks.

A quick way of attaching a temporary mast to a solid fixture.

It's a great opportunity to test things out, compare (and have time to rectify any issues!) before the Spring/ Summer Field Days.

Leith ZL1BCJ and Simon ZL1SWW developed a quick way to get a stable antenna mount where you know there will be fence posts or other solid items that the device can be clamped to. No messing about with stay wires was the objective, so we developed a mount that can quickly be attached to a flat or rounded object by ratchet tie-downs. These give an extremely strong mount and with a locking screw, allows stable antenna pointing as well as a quick and tidy antenna erection. A bit of angle iron and a welder can work wonders!

2011 VHF-UHF-SHF Contest Calendar

Field Day Contest

All bands 50 MHz and up Saturday 3 and Sunday 4 December. For all contests, the operating periods are 1700 to 2300 on the Saturday and 0700 to 1300 on the Sunday, New Zealand local time. The complete Contest Rules are available at: <http://www.vhf.org.nz/pubs/Contests/VHF-UHF-SHF-ContestRules>.

Summary

Acknowledgement and thanks; to ZL1RS, ZL1IU, ZL1TPH, ZL4JY and others for article input for the column.

If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call Book* addresses. (I also accept large picture files sent via email).

Satellite Orbits

Andrew Barron ZL3DW
<ad.barron@xtra.co.nz>

OSCAR I and Amateur Radio Satellites: Celebrating 50 Years

This month sees the 50th anniversary of the historic launch of the first Amateur Radio satellite OSCAR 1 built by radio hams in California. Just four years after the launch of Sputnik 1; the first ever man-made satellite to achieve orbit OSCAR 1 was launched on 12 December, 1961 from Vandenberg, AFB aboard an Agena rocket. This was a remarkable technical achievement as OSCAR was the first 'non-government' satellite and was built entirely by radio ham amateurs.

The satellite was a curved box shape with a single monopole antenna and battery power. The 140 mW transmitter onboard discharged its batteries after three weeks. 570 Amateurs in 28 countries reported receiving its simple "HI-HI" morse code signals on the VHF band on 144.983 MHz, until 1 January, 1962. The speed of the HI-HI message was controlled by a temperature sensor inside the spacecraft providing data for future missions. OSCAR 1 re-entered the atmosphere 31 January, 1962 after 312 revolutions.

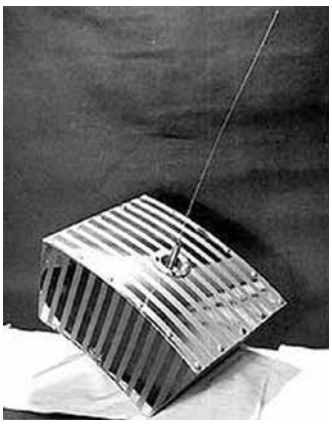
It was a 4kg, 30 by 30cm satellite and three of them were built. One went into space on 12 December, 1961, one is on display at the Smithsonian, 'Air and Space Museum' in Washington DC and the other was until recently sitting in a display case on the first floor of the ARRL HQ building in Newington.

ARRL Lab Test Engineer Bob Allison, WB1GCM recently had a "light bulb" moment: Why not take the back-up OSCAR I on display at ARRL Headquarters and make it work again? The refurbished OSCAR-1 was put on display at the ARRL exhibit area at the 2011 Dayton Hamvention and again during the AMSAT Symposium where everyone was able to once again hear the CW transmissions (now managed by a PIC controller) in the 145 MHz band. Read the full ARRL article *OSCAR I and Amateur Radio Satellites: Celebrating 50 Years,* <http://www.arrl.org/news/oscar-i-and-amateur-radio-satellites-celebrating-50-years>.

This week AMSAT-UK website carried the announcement that PW-Sat, a 1U CubeSat to be launched on the first VEGA flight in January, will carry a 145 to 435 MHz Amateur Radio transponder. The single channel transponder will operate in a similar way to AO-16 which was converted from digital operation to an FM/DSB voice transponder after a failure of the onboard computer hardware.

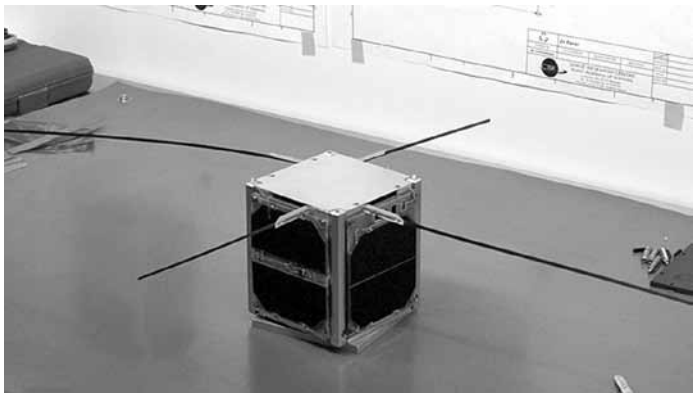
The uplink for PW-Sat will be on 145.900 MHz FM and the downlink 435.020 MHz will use the BPSK telemetry beacon transmitter to produce Double Sideband (DSB) that can be received on an SSB radio.

PW-Sat will be launched into a 300 by 1450 km, 69.5 degree orbit and may be expected to have a lifetime of about two years before re-entry. It was built by students of Warsaw University of Technology in cooperation with the Space Research Centre and will be Poland's first satellite.

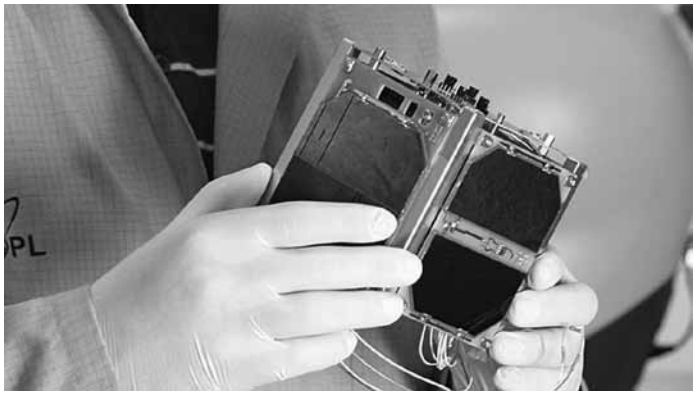


OSCAR 1 the first amateur radio satellite, was launched 50 years ago this month.

OSCAR 1 construction methods were very different from today's high tech Cube Sats.



PWSat ready for deployment.



PWSat will have an VU mode transponder with an unusual FM uplink and DSB downlink.

ISS

I hope this video will still be available, when you read this. I found it fascinating, watching the laws of physics in action. While Expedition 29 Commander, Mike Fossum, and Flight Engineers, Satoshi Furukawa and Sergei Volkov float freely inside the space station the acceleration of the orbiting complex is evident as the International Space Station is boosted into a higher orbit. See: <http://tinyurl.com/6gg996y (nasa.gov)>.

AO-51 has been one of the easiest-to-work FM satellites using its VHF/UHF mode, but its days are numbered as the batteries are in a poor state. The satellite shouldn't be working at all! Two of its six battery cells are shorted so it should be dead! It has been performing magnificently, with 850mW output power over the past two months; a true tribute to the team that built it and the AO-51 control team!

There is news from AMSAT South Africa that a new 10cm CubeSat being built by students of the Cape Peninsula University of Technology (CPUT) will include a beacon operating in the 20m amateur band. The beacon operating on 14.099 MHz will be used for an experimental HF radar system. The SuperDARN radar system will measure how the ionosphere is moving above the polar cap by detecting echoes reflected by patches of electrically charged particles.

ARISSat-1

Russian flight engineer Alesander Samokutiaev and Sergey Volkov deployed ARISSat-1 during EVA-29 on 3 August, 2011. The satellite's battery is now failing and there are little or no transmissions when ARISSat-1 is not illuminated by the Sun. The satellite is usually operating in the low power 'emergency' mode even when it is in sunlight. When ARISSat-1 is in sunlight, program your radios to monitor the 145.950 FM downlink while you can. There are 24 pre-recorded greeting messages; including one from Yuri Gagarin talking to his ground crew during his historic flight in 1961!

New OSCAR satellite

Following the successful NASA ELaNa III launch on 28 October, 2011 of AubieSat-1, and by the request of the AubieSat-1 team, the new satellite has been assigned the OSCAR number AO-71 (AubieSat Oscar 71). AO-71 was developed by undergraduate students at Auburn University, Alabama. It carries an 800mW CW beacon on 437.475

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>

Amateur Radio (WIA)
October 2011

p16 How to manufacture a double sided PCB.
p27 The Simple SDR: a basic software defined radio anyone can build – Part Two (with VFO to give 20kHz IF for sound card).
p33 Short unloaded whip antennas and the effect of shunt capacitance at their base (resolving the odd result in "A basic trap for young players" in August 2010 AR).

CQ
October 2011 Emergency Communications Special

p24 Trusting the Battery in Critical Situations.
p28 Medical "Go-Kit" for Hams.
p36 Optical Communications Revisited.
p101 More on Lightning Protection.

QST
October 2011

p30 Moxon Mighty Mite (for 70cm band with construction details and NEC parameters).
p34 Automating the Ameritron RCS-10 Remote Antenna Switch (binary encoding to control 8 antennas with 4-wire cable).
p37 A Receive-Only Antenna Adapter (for transceivers which don't allow separate TX/RX antennas).
p40 The Care and Feeding of a 3-500ZG Amplifier.
p42 The DK7PE Jumper Beam (vertical wires as beam elements slung from 40 foot fibreglass pole).
p44 A Remote Impedance Matching Network (varying L and C with 2.4V electric screwdriver motors).
p48 The Folded Skeleton Sleeve on Other Ham Bands (folded and unfolded versions for two bands).
p49 Product Review: ICOM IC-7410 HF and 6 Meter Transceiver.
p59 Hands-On Radio #105: Gain-Bandwidth Product.
p98 Circular Polarisation.

November 2011

p31 Build Your Own DSP Speaker.
p35 An Antenna idea for Antenna Resricted Communities (loops as lawn sculptures).
p38 A Four Tone SSB Test Generator.
p42 Internal Full Break-in Keying Interface for the ALS-600 Amplifier.
p45 A 160 or 80 Meter Downspout Vertical.
p49 A Skype Phone Patch–No Extra Hardware Required.
p51 How High Should Your HF Vertical Be?
p55 Product Review: Yaesu FT-450D HF and 6 Meter Transceiver.
p64 Hands-On Radio #106: Effects of Gain-Bandwidth Product.
p69 Android Apps for the Amateur.
p75 Splitting Up Isn't Hard To Do (learning to operate split).

RadCom
October 2011

p16 The Figure of Eight Loop.
p19 Homebrew: Continuing the AD9951 DDS project.
p24 PICaYAGI Part 4: the software, user interfaces and performance.
p38 Design Notes: Mixing at low frequencies.
p45 Start Here: Understanding radio review terminology.
p54 VLF through the ground experiments.

SPRAT
Autumn 2011 #148

p5 ATU With Plug-In Modules.
p8 VHF Super-regenerative Receiver.
p14 SuperMAAn (Miser's Antenna Analyser with program in BASIC).
p18 Open Wire Feeder Current Meter.
p27 Variable Inductance Loop (120cm diam.,14,21MHz,ferrite rod tuning).

MEMO to *Break-In* contributors

CDs:

Nowadays many contributors are sending me graphics and photos, etc on CD and this is much appreciated. At present the cost of a CD is less than the postage costs so, unless requested otherwise, they will not be returned. Please let me know asap if I still have a CD or photo that you would like returned and I will action. Thanks, *John ZL3IB Editor*

MHz, ± Doppler correction. The beacon signal, along with telemetry, will be sent using A1A continuous wave Morse code at 20 words per minute. Additional telemetry from the onboard science experiment will use CW transmissions up to 60 wpm.

Finally, Merry Christmas everyone and best wishes for a 'radio-active' new year. Keep safe and next year why not try some new aspect of our wonderful ham radio hobby. Work a satellite, write an article for *Break-In,* or build an antenna. After 35 years as a ham and with some help from the computer, I recently managed my first ever on air CW contacts... so you can teach 'an old dog new tricks'.

73, *Andrew ZL3DW*

Old Timers' Club

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>

Secretary/Treasurer:
Roy Symon, ZL2KH
Mail:
25 Annandale St,
New Plymouth
Phone:
06-758-2156
E-mail:
<zl2kh@xtra.co.nz>
Monday Evening SSB Net:
Net details: 2030 hr (local time) each Monday on 3.870 MHz LSB.

It's hard to believe that we are at the last issue for another year. Where do the months go? I have received nothing for this page so all we have for this month are the details of Silent Keys and the recipients of long service certificates.

Silent Keys

There are five members to farewell this month. They are:

- 921, ZL2BFJ, Peter Ireland, Levin.
- 617, ZL2JR, Jim Robertson, Plimmerton.
- 832, ZL1AZX, Jack Armstrong, Kawerau.
- 496, ZL1NJ, Bruce Ecclesfield, Tauranga.
- 1052, ZL3AG, Eion Gibson, Christchurch.

Certificates sent out

The following members have received long service certificates:

60 Year Certificates:

- 1166, ZL1AIH, Ken McCormack, Waimauku
- 1146, ZL2ABB, Staf Campbell, Palmerston North
- 1185, ZL2ADP, Morry Vile, Carterton

50 Year Certificates:

- 1078, ZL3CE, Ian Hewson, Kaiapoi
- 751, ZL2DG, Dave McBeth, Waitara

Congratulations to all of you.

Conclusion

I hope you all have a very merry Christmas and a very happy New Year. Please make a new year's resolution to send in some copy for this page.

Roy Symon ZL2KH
OTC Scribe

SPAM – Society For The Preservation Of Amplitude Modulation

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>

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Nets:
3.850 MHz (AM) Friday nights at 2000 hr local time.

There are no new members or Silent Keys to report this month. What we do have is an article by Allan ZL1AJH about some modifications he made to his FT200. I know this is not strictly AM but involves a transceiver with valve technology so it is included here.

My Yaesu FT200

By Allan Hobbs, ZL1AJH

I've been working with valves for many years, so when the opportunity to own a Yaesu FT200 turned up I grabbed it. A couple of new tubes and a handful of capacitors and it was on the air … but it drifted and, without someone on frequency up, I didn't know exactly where I was. For some time I've been researching how to do it so I made a digital readout for it and it worked well: just dial up the frequency on the readout and then just nudge the knob to keep it on. It looked as if putting a synthesiser in it was fairly easy as it is single conversion. I found a built up kit in New Zealand from Chris Daye so I purchased it and once I had got my head around the programming it was a snap.

The synthesiser replaces the VFO and the band crystals. The 6CB6 that was the VFO/crystal mixer is now the amp for the synthesiser. It was just a matter of removing the old VFO and the crystals board and feeding the output of the synthesiser to the grid of the 6CB6. I added a bypass capacitor on the cathode and it worked. It was a bit down as the synthesiser level was 200mV on 80m and 20m don't mix the VFO with a crystal, so it only had a choke in the plate circuit. I added a tuned circuit in the anode to increase the voltage and used a spare 5/30 pF capacitor on the main grid gang capacitor to tune. It took a bit of fiddling to get it to track properly, but that got the injection level up and the same with 20m.

I got the supply for the synthesiser from the 12V AC with a rectifier, a 1000µF capacitor and a 7812 regulator. It doesn't need the regulator but if something gets out of shape the regulator will stop it. I put the rotary encoder at the back of the VFO hole and a shaft through a bearing in the front, to give it a better "feel".

The rig works just as it did. You still tune the grid and the plate loading except when the display says 3677 you are on 3677. The clarifier doesn't work but you can set the step from 1 MHz to 1 Hz. I usually have it on 1 kHz steps and switch it to 100 Hz when I'm on a net. It is very stable even when "cold" and it's bang on frequency when I expected some drift for the BFO as it's valve but it's not noticeable.

Figure 2. Parts Placement 1.

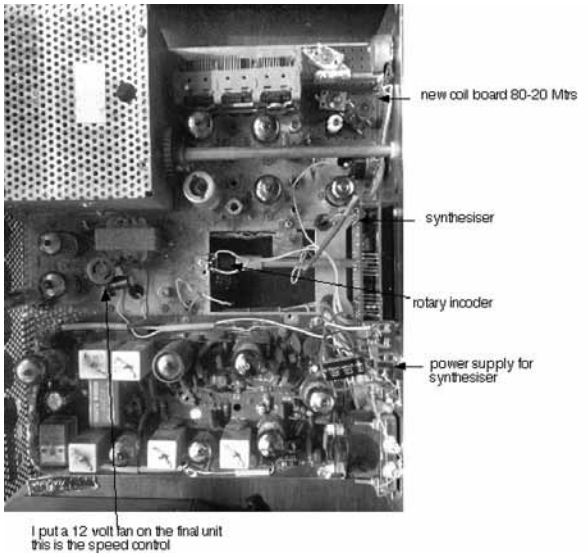
new coil board 80-20 Mtrs
synthesiser
rotary incoder
power supply for synthesiser
I put a 12 volt fan on the final unit this is the speed control

Figure 3. Parts placement 2.

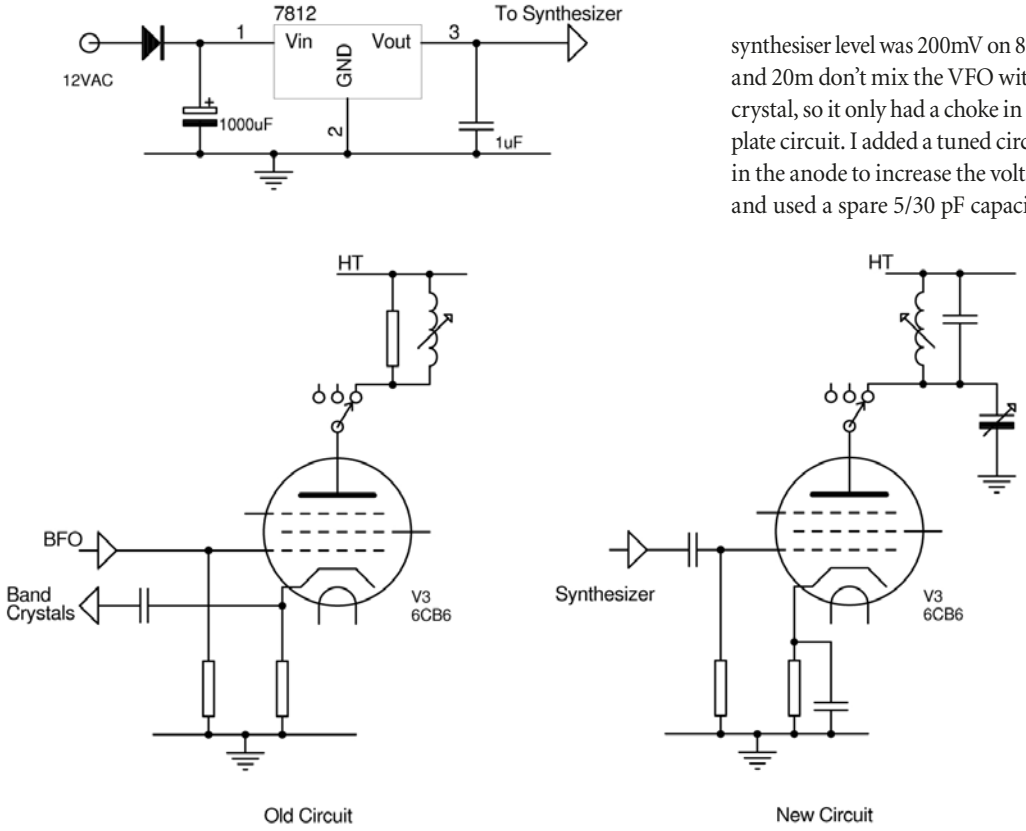

Figure 1. Circuit.

Figure 4. Modified FT200.

I have not done any other mods to it. It has made the rig very easy to tune especially on weak signals. I plan to put one in my FT101.

One little glitch; when it's on upper sideband you add 3 kHz to the readout and it doesn't go over 20MHz but I'm working on that.

Conclusion

Thanks for the article and the photos Allan. I hope it will inspire others to send in some material. As this is the last issue for the year, I hope you all have a very merry Christmas and a happy New Year.

Roy Symon, ZL2KH
Secretary/Treasurer, SPAM (NZ)

Letters To The Editor

All Letters to the Editor must be signed and include the author's full name, call-sign, (if applicable) and address. Opinions expressed here are those of the author and do not necessarily reflect official NZART policy.

Letters to the Editor: guidelines to contributors

Letters to the Editor should be concerned with Amateur Radio and normally not exceed 400 words. Break-In *follow the guidelines given on page 4-3 of the 2002-2003* Call-book *"Standards of language, and topics best avoided". Accordingly sex, race, religion and politics are not acceptable subject matter.*

Sir

Help wanted; satellite TV mods, etc

Here in Te Anau I have a satellite TV with built-in Freeview and a Zinwell digital recorder; both having RF inputs only for a UHF antenna. I also have satellite TV via a set top box. Basically there are two ways to receive Freeview, satellite using a dish and set top box, or using a UHF antenna and set top box. New Zealand does not have full UHF coverage so devices that require a UHF input will only work in those areas with UHF coverage. Satellite Freeview is available everywhere. Te Anau has no UHF coverage so the built-in Freeview will not work in Te Anau. The Zinwell recorder only has an input for UHF.

Is it possible to convert the Satellite TV set-up to suit the RF-UHF inputs which are the only inputs on these devices? What I am looking for is a device that accepts the satellite input and outputs it in a UHF form suitable for the Zinwell recorder. Can anyone help?

Neville Stronach ZL4CI
nev.stronach@xtra.co.nz

Contests

Contest Manager: Frank Hunt ZL2BR
<zl2br@ihug.co.nz>

We have sunspots!

Yes it sure seems that we are back in business for real now. As I write, the Solar Flux Index is 181, the highest it's been for around eight years. So let's make the most of it, you never know what propagation will be like in a few months down the track.

There are plenty of contests coming up over the summer, starting off with the ARRL 10-meter contest, which should be a real humdinger and I strongly suspect there will be a few records broken this year.

How to get spotted in a crowd

My time available for contesting has been severely restricted this year and I couldn't even do the whole 24 hours of the Oceania CW contest as I normally do. So I decided to just operate single-band on 10m as the SFI in early October had started to rise a bit.

I was logged into the DX-Cluster via telnet as I operated and it was great to note that there was a good number of VK, ZL and other Oceania stations active in the contest. As the contest progressed, I began to notice that a certain W3 super-station (who, by the way I never did work), was also a super-spotter as he/she/it was giving out heaps and heaps of spots, especially to VK and ZL stations.

Then suddenly I realised what was going on, the W3 station was using Skimmer software and which was configured to auto spot. To check this out I changed my CQ run frequency a few times and wham, every time I changed frequency and called CQ, I was spotted again. This was great, no longer do have rely on someone I have just worked to spot me, I can virtually and legally do it myself.

What is Skimmer? Please check out what I wrote about it and the Reverse Beacon Network in my Nov/Dec 2010 *Break-In* Contest notes.

International HF Contest Calendar for December 2011 – February 2012

Contest	Date	Time UTC	Website
ARRL 10m CW/Phone Contest	Dec 10/11	0000 Sat - 2400 Sun	<www.arrl.org/10-meter>
Croatia CW/Phone Contest	Dec 17/18	1400 Sat - 1400 Sun	<www.9acw.org>
Czech RTTY Contest	Dec 17	0000 - 2400 Sat	<www.crk.cz/ENG/DXCONTE>
RAEM CW Contest	Dec 25	0000 - 1200 Sun	<www.raem.qrz.ru/contest/raem_2011/rules_eng_2011.php>
SARTG Happy New Year RTTY Contest	Jan 1	0800 - 1100 Sun	<www.sartg.com>
ARRL RTTY Contest	Jan 7/8	1800 Sat - 2400 Sun	<www.arrl.org/rtty-roundup>
Hungarian CW/Phone Contest	Jan 21/22	1200 Sat - 1200 Sun	<www.ha-dx.com/HADX>
BARTG Sprint RTTY Contest	Jan 28/29	1200 Sat - 1200 Sun	<www.bartg.org.uk>
REF CW Contest	Jan 28/29	0600 Sat - 1800 Sun	<concours.ref-union.org/contest/>
UBA Phone Contest	Jan 28/29	1300 Sat - 1300 Sun	<www.uba.be/sites/default/files/uploads/hf_contests/ubatest_dx.pdf>
CQ WW 160m CW contest	Jan 28/29	0000 Sat - 2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>
CQ WPX RTTY Contest	Feb 11/12	0000 Sat – 2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>
PACC CW/Phone Contest	Feb 11/12	1200 Sat - 1200 Sun	<pacc.veron.nl>
ARRL DX CW Contest	Feb 18/19	0000 Sat - 2400 Sun	<www.arrl.org/arrl-dx>
REF Phone Contest	Feb 25/26	0600 Sat - 1800 Sun	<concours.ref-union.org/contest/>
UBA CW Contest	Feb 25/26	1300 Sat - 1300 Sun	<www.uba.be/sites/default/files/uploads/hf_contests/ubatest_dx.pdf>
CQ WW 160m Phone Contest	Feb 25/26	0000 Sat - 2400 Sun	<www.cq-amateur-radio.com/cq_contests/index_cq_contests.html>

AREC – Amateaur Radio Emergency Communications

Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi everyone,

It was recently announced that the Silverfern Rally, a biennial event held previously in the South Island, next year will be held in the north for the first time. It might be appropriate to look back on the last event, to give some idea of what might be to come. Fortuitously, we had an item, from a driver's perspective, of the 2010 event. It was circulated earlier this year in e-mail form, but took us some considerable time to secure permission to publish here. Also fortuitously in that, as our last remaining reserve, it was available to cover the fact that no other material was received for this issue. Unless material is forthcoming for the next issue, there will be no AREC column published.

Our Adventure; Silverfern Rally

Seven Days Rally driving in the South Island of New Zealand; 2909km overall distance, 1059 km gravel stages, split up into 42 stages. No viewing, no testing, sight/visibility driven only. Dangerous areas are noted in the road book with "warning" as well as signs on the route. A simple concept, start 8am, three stages, lunchtime 30 min, three more tests in the afternoon; first vehicle crossing the finish line around 6pm. Longest special test 100.75 km. The Rally proceeds as we know it from earlier days of rallying, once started the followers continually move on. Every stage is driven once only. It was therefore a big challenge for our service teams who had to approach 41 service points in seven days and cover 2600 km. But before we even left for New Zealand we received some bad news; our cars, Willis Porsche and my Escort had been damaged during transport to New Zealand. We shared a shipping container, the cars were not secured and smashed against each other during the journey; pictures showing the damage were available to us. We knew what we had to do in the days before the start in Christchurch, unpack the big hammer and beat our cars until the panels were straight again.

Work waiting. The journey went from Vienna, via Dubai, Bangkok and Sydney to Christchurch due to a low cost ticket with a nine hour stopover in Dubai. Picking up rental cars and evaluating the damage on our cars, we knew a lot of work awaits us. The shipping company allowed us to work in one of their storage sheds; the locals were unbelievably helpful. The restoration work progressed, vehicle registration took a little longer, a good reason to take Wednesday off. We took the TranzAlpine from Christchurch to Greymouth, breathtaking scenery through the Southern Alps and a four hour train journey from the East to the West Coast. Thursday, completion of repair jobs on our vehicles including rattle can paint job, New Zealand road registration was complete and our vehicles now had a New Zealand §57 stamp (Austrian for WOF). Friday, while the service teams were filling up the vehicles with supplies, the drivers/co drivers worked out strategies, midday scrutineering and we named our team "Team Europe"; Polesznig/Stark, Pointinger/Noelscher and Samuel/Phillips (GB). Saturday morning service meeting — we know this in Austria from hearsay only. Ceremonial started in the afternoon at Cathedral Square in Christchurch and in the evening a driver meeting.

It started. Because it's the day of the Lord we only start around 10. It leads us to Banks Peninsula east of Christchurch. For warm up and getting used to, the first six stages are the shortest of the week. The longest is only 14km and that is more than enough for a start. Imagine driving without route map; only visual, blind hills and corners are everywhere and every time I take my foot off the accelerator or brake unnecessarily, a long loud "*Shiiiit*" goes to the co driver via intercom. He needs to hear my suffering as well. The time service is unbelievable, as soon as we pass the finish line of the stage, the time is transmitted to the mobile phone. My co-driver is so enthusiastic about it that he tells me, lukewarm, that the fastest driver just took a minute off our time. So what, he is a local hero anyway.

Nevertheless we finish the first driving day on rank 14 overall so we're happy. The second day takes us 418 km far to Timaru covering six stages with an overall distance of 122km. During stage eight the fun started to fade, the escort started to behave strangely and the engine died twice without warning. My first thought was fuel which was proven to be right, there was enough fuel in the tank but the filter was blocked by what appeared to be foam material from inside the tank. Daily cleaning of the fuel filter has now been taken into the standard service programme. This evening we found ourselves on rank 17 overall, exactly one second ahead of Polesznig/Stark; this is promising to be an interesting week!

Lost in the Black Forest. Third day driving, from Timaru to Dunedin. 501km, of which are 159km stages. The second stage of the day has characteristically been called "Black Forest" but it was not a Black Forest drive at all. This stage was the worst of all, untypical for New Zealand. Incidentally I know the sister of this stage, she lives in Kenya and is called "Taita Hills". The escort started to lose power rapidly 7km into this stage and we had to park it up in one of the best places in the world to solve problems (not); absolutely nothing in the vicinity of 30km. During the six hours we had to endure there a rabbit scampered past us twice and that was it. We unsuccessfully tried to reach our service team via mobile but no cell phone coverage. Our last hope was the sweep car that arrived at last, the driver informed us the ambulance following has a satellite phone on board. When it came along we asked the ambulance driver if we could use the satellite phone and he answered that the use incurs a charge of $ 100 with a smile on his face. Now, any unstable soul could have developed a flared temper but we did understand the ambulance Kiwi's dry humour and offered him a beer when we get back. We make our call with the service lads!

Emergency repair and engine speed limit. The lads turn up three hours later, we take the cylinder head off and found the blown head gasket we assumed. That alone would not have been a problem but the engine block was a little insulted between cylinder 1 and 2, some of the material on the sealing area burned away. Our faces are getting longer and we're in a bad mood. It's certain that we need to get out of here and drive another 300 km to Dunedin. We decide an emergency repair to try to reach the next tar-sealed road which is 50 km away. We repair the area with liquid metal and install the cylinder head with a new head gasket. No one would bet even a cent on it that this lasts but we have no other chance. The engine jumps back into life around 5pm and we leave this dreaded place. We reach the asphalt road but don't rev the engine higher than 4000 rpm. I decide we drive for as long as the engine holds up. We arrive in Dunedin around 9:30pm on our own wheels. It is clear to everyone; we will be on the start tomorrow. The engine may last with an engine speed limit of 4000 rpm. In the meantime Wolfgang called around trying to find another engine for us at first without success. We order our escorting fans, family Seifert and Gerti to organise "Head gaskets", and from now on we're travelling with three cylinder head gaskets in our luggage.

The Commodore and centrifugal forces. We are starting the fourth day with a dull feeling in our stomach, 468 km overall distance to cover, 249 stage km including the longest stage of the Rally over 100 km, if the engine dies then good night. We are mastering this day with a lot of self-discipline and the occasional engine speed of up to 4500 rpm. If you can't compete fully due to engine safe driving and engine speed, one can diversify his drive so it doesn't get too boring. As happened on stage 20, Campbell Wright started behind us, we knew he would appear in the rear view mirror around kilometre 20 which was exactly the case. I observed the image in the rear view mirror, he comes closer, the dust is still acceptable. We reach an ideal spot to let him pass, a decline from a small hill, followed by a 300m long straight with a 90 degree bend at the end, I guess 2-3 to the left. I slow down and say to Wolfgang "Look out", the Commodore emerges from our dust cloud goes past the escort and has approx 50m to control damage possibilities. We were sure that's not

gonna work . We were right to 50%, the Commodore driver brilliantly throws the car around the corner but he cannot defy centrifugal forces and the rear end comes off the road half in the ditch and we were waiting for the finishing roll over. The rear end somehow finds its way back on the road and he carried on. We are driving in the dust cloud from now on, it was worth it, we had a lot of fun and were thankful for the entertainment.

Can you tell me what's written there?… The fifth day leads to Invercargill, the southernmost part of the island. 409 km, 179 stage km. The word has gone around that we're experiencing engine problems and need a spare engine. John Keast (number 28) operates a workshop in Invercargill, he's got a spare Sierra engine we can have if we need it. Good to know something's around in case its needed. Polesznik/Stark are having problems on stage 27, the clutch lever breaks and they cover the remaining 30 km's in third gear. We're in luck, the 30 min lunch break is next after this stage. We reach Invercargill without problems increasing the engine speed to 5000 rpm, we need to decide now if we take the Sierra motor or do we carry on with the emergency repair? We decide, if the repair lasted this long, it will last the two remaining days as well. On the sixth day the route goes 423 km from Invercargill to Alexandra including 182 stage km. We are having almost no problems when Wolfgang puts his helmet on and breaks his glasses. Not tragic there are spare glasses for him in the service vehicle, until we got there he held the road book under my nose with the request "can you tell me what's written there?" No problems otherwise.

Time taking kiss. Seventh day, the escort does not want to start the next morning in Parc Ferme. Not even with the assistance of push-starting Rally colleagues. The time taking lady has observed this whole drama and decided it is time to interfere, she comes over and asks if we have a tow rope; gets her car and tow starts the escort and the escort's engine jumps back into life. She is so happy that the escort is running and happily gives Wolfgang a kiss on the cheek; we're on our way without time penalty! The route today goes from Alexandra to Queenstown, 381km with only 108km stage left. The organisers came up with something special for the second to last stage; it went over Duffers Saddle, the highest mountain pass road New Zealand (1300m) into Nevis Valley. It was starting to rain and this affected the road very badly, driving uphill was partially only possible not faster than walking speed, there was immediate wheel spin as soon as one tried to go faster. The drive downhill was substantially more interesting: locking wheels needed to be avoided under all circumstances otherwise the car slid like a piece of soft soap. Once all vehicles crossed the finish line it was planned to run the same stage as last stage in the other direction. The organisers however cancelled it for safety reasons, fog came up which made the operation of a helicopter impossible. Willi and Peter fought for the last stage metres yet came twelth overall due to only one second time difference! We came 26th overall not last and third in the team ranking out of six teams. After the award ceremony we went to a bar and chatted about the events of the past week. The Englishman, Peter Egerton, brought it appropriately to the point when I asked him what he would do next: "Everything I do, it would be a step backwards."

Carl Rabbidge

Activity Briefs

(A selection from Sept/Oct)

3/09/11. Northland Branch 28. SAR. Western Hills, Whangarei. 13 missing hikers caught by darkness. They found their way to a house on the edge of the bush before search got underway.

8/09/11. Hastings-Havelock North Branch 13. SAR. Firearms incident involving AOS, Police, LandSAR, AREC. Shots fired, cries of help reported. Possibly mistaken for goats calling out. Extensive search by Police, AOS, dogs and SAR personnel, including use of helicopter. No person found with firearm. Dead goat and pig found but not related to incident. Search called off around 1830hr.

11/09/11. Hamilton Branch 12. Sports & Training. Kairangi, south of Cambridge. Safety communications for Vintage Car Club hill climb. Very successful day despite rather wet and slippery conditions on the track. Car Club extremely happy with the quality of the communications.

13/09/11. Motueka Branch 24. Sports & Training. Motueka area. Training on radios and voice procedure for SAR teams, followed by short night exercise using skills covered. Three teams of two and one of three people were sent out to report back on clues planted at different GPS locations. A worthwhile evening for base personel and teams.

17/09/11. Auckland VHF Group Branch 66. Sports & Training. Onehunga, Auckland. Provided communication for Auckland Heritage walks. Very successful day, good communications. Organisers pleased with result.

18/09/11. Eastern BOP Branch 51. SAR. Motu River. Hunter separated from partner and did not return. SAR called next day for search in the Upper Motu. Base in Whakatane on HF and VHF. Helicopter sweep saw smoke from lost party who started fire when he heard helicopter sweeping valley below him. Lost party out by 1600 hr.

18/09/11. Tararua District Branch 06. SAR Training. Norsewood Rural. Tararua Annual Mini SAREX. Two lost teenagers, one with Autism, on rural farmland west of Norsewood. Seven teams deployed into field to search area between State Highway 2 and Ruahine Range. Low to medium rolling land with 100m plus sheer drops into Mangatewainui River and Mangatewaiiti Stream. ESB56 SAR and local ESB164 STSP's utilised. Communications lost with SAR repeater around 1000hr. Team deployed into field to investigate, faulty external battery pack identified, switched to internal batteries, communications restored. Lost parties found 1430hr. While teams returning to ICP call received of person yelling for help near where SAREX held. Two teams redeployed to area, nothing found, believed to have been young bull calling out and mistaken for person calling for help.

24/09/11. Northland Branch 28. SAR Training. Waipu Caves, Northland. Combined Whangarei/Auckland SAR Cave Rescue training exercise.

27/09/11. Otago Branch 30. SAR. Port Chalmers Search for a missing mentally ill woman who rang and advised her partner some two hours drive away, that she was at Port Chalmers. Communications were provided via the Marine CH62 repeater and ESB 58 repeater located on the Otago Peninsula. Teams were sent to search the township and wharf area around to Carey's Bay. At 7am there was a shift change with a new group of people coming in to take over. Teams continued searching Port Chalmers and the roads over to Waitati after a sighting was reported by a member of the public. At around 11am the missing woman turned herself in at the Dunedin Central Police Station.

9/10/11. Manawatu Branch 20. SAR. Highbury area. Missing three year old girl found safe.

12/10/11. Motueka Branch 24. SAR. Kaiteriteri, near Motueka. 13 year old girl reported missing from family home. Confinement team sent to Rowling Road. Boat team were launching to search shoreline when missing party reported as located. Found by member of public near her place, in distressed state but physically OK. Suspect family argument.

13/10/11. Tararua District Branch 06. SAR. SAROP "Thomas". Advised of possible 1X, overdue 62 year old farmer. Search by family and locals night before failed to locate missing party. Search called off due to weather and dangerous ground conditions. Area steep rugged terrain with heavy bush cladding. ICP established in woolshed and SAR teams deployed into field at first light. Simplex used while SAR repeater deployed into field. Lost party located in implement shed on farm. Private helio used.

25/10/11. North Otago Branch 64. SAR. Oamaru. Training night in the use and procedures of using VHF radios and GPS's, 15 people attended.

27/10/11. Tauranga ECG Branch 88. Sports & Training. Scout Hall,

continued on page 34

Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

I would like to wish everyone an enjoyable Christmas and best wishes for 2012. If you are mobile during the holidays the Awards Net would like to hear from you. 9 p.m. NZDT 3.677 MHz.

As promised in October *Break-In* the details for the 2012 Kordia National System Award are listed below. The list of Historic Places is too long to be included in *Break-In* (eg; 264 places under Christchurch).

Kordia National System Award – 2012

This award is presented by the Hamilton Amateur Radio Club, Branch 12, NZART in association with the New Zealand Historic Places Trust. This is a FUN award available to all amateurs to demonstrate the coverage and use of the National System, to promote our history and category 2 Historic places. Detailed documentation is available from:- <http://zl1ux.tripod.com/nsaward.html>.

The award will run from 1 January 2012 to 6 February 2012. Points will be allocated for:-

- Contact with any Amateur in each NZART Branch area, via the National System. Only Branches on the provided list are valid. Note that the station must be within the Branch area to qualify. List available from <http://zl1ux.tripod.com/nsaward.html>. 1 point
- Contact with ZL1UX, official station of Branch 12 via the National System. 3 points
- Contact with any Amateur, via the National System, operating from a Category 2 Historic Place (as listed in the Historic Places Trust Register, available at (<www.historic.org.nz>). 1 point
- Contact with any Amateur, via the National System, whilst operating from a Category 2 Historic Place as listed in the Historic Places Trust Register, available at <www.historic.org.nz> 1 point

Points are cumulative and each site may only be listed once. Only one branch or historic site may be logged per contact. The log must record the registry number of the site, available from the Historic Places Trust Website at <www.historic.org.nz>.

Participants are requested to note the following key points:

- Safety is paramount, please be considerate of the safety of the field operator when making contact.
- A number of the Historic Places are private property; therefore participants MUST respect the private property. It is not necessary to enter any private property to log the contact. Participants are expected to be in near proximity to the Historic Place, not on the site.
- There are no definitive boundaries between branches, so participants need to determine which branch they are in, to log the point. This distance will vary for different parts of the country. Only one branch can be logged per contact. Branches in recess DO NOT count.
- Participants are encouraged to learn about the NZART branches and the places that define our history through visiting the Category 2 Historic Places.
- We would appreciate receiving photos of Category 2 buildings for display on our website. Email to address below.
- Award Custodians are Phil King, ZL1PK and Gavin Petrie, ZL1GWP.
- Send a log of contacts, with all details as per the standard log sheets provided, including a preferred award certificate format (electronic or hard copy) to:
  The Award Custodian
  Hamilton Amateur Radio Club
  PO Box 606
  Hamilton 3240
  Or Email:- <branch.12@nzart.org.nz>
  with NS2012 in the subject line.

Applications close on 6 March 2010.

Below is a copy of an email received from Bob G3PJT.

I also have copies of the score sheets and check sheets and can send them via email <awards@nzart.org.nz>.

Commonwealth Century Club Jubilee Award 2012

2012 is the Queen's Diamond Jubilee and mindful that the Queen is the head of the Commonwealth of Nations we are pleased to announce a new operating award for 2012. To qualify for an attractive certificate all you need to do is to work as many different countries and call areas on the Commonwealth Century Club list during 2012. Certificates will be awarded for working 60 and 100 different call areas. Use any mode or bands you like and QSL cards are not required. We will be running a league table. Score sheets and full details can be downloaded from <www.beru.org.uk/CCCaward/CCCindex.html> or via <G3PJT@btinternet.com>.

Start date 1 January 2012!

73 and thanks

Bob G3PJT

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140, <awards@nzart.org.nz >.

REMEMBER:

Leave a three second pause between overs when using repeaters.

Someone else may have an urgent message.

Next deadline for copy is
10 January

◂ *continued from page 33*

Welcome Bay, Tauranga. Scouts JOTA event. 20m QSO VK2, VK4, JA, EA9IE 15m VK2, VK3,VK4 VHF IRLP VK4

30/10/11. Christchurch Branch 05. SAR Training. Harris Trophy – Spencer Park, Christchurch. Annual SAR competition for Canterbury SAR teams. Successful event, seven teams competing for the Harris Trophy and AREC Challenge trophy.

Conclusion

Thanks to those who have contributed to this issue and also throughout the year. Material for the next one to please be in our hands by 3 January 2012. Photos, if included. preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz> or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

We wish to extend best wishes for the festive season and may you all have a safe and enjoyable time.

Reminder

As there is not normally a Section Leaders Net in December, the next one should be 16 January 2012, 3900 kHz USB at 2030 hr NZDT unless notified otherwise.

Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV*

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QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

The time has arrived for the annual clearing of the Bureau's pigeonholes that have not seen a posting since the end of 2010. Later this month I will be having a mail-out to those small bureaux that have had insufficient cards to fill an envelope during this past year. Over the next couple of weeks, please take time out to forward your QSL cards to Box 857 to catch this mail-out. This mailing will take place by 31 December so please expedite your cards!

I was one of a small group of people who took a 'mid-term' break in September and spent a few days canoeing and tramping in the Whanganui National Park. Staying at the John Coull Hut, amongst the fellow guests were eight French men, six of whom were doctors, taking a short break from following their rugby team. Suffice to say they would have been very surprised when their team made the final! I returned to the home QTH just in time to 'celebrate' the last day of the Post Office 'economy mail' service with the posting of 9kg of QSL Cards to Japan.

So far this year, the QSL Bureau has received 10 000 QSL Cards (2010, 6674cards) from the JA Bureau. In recent times returns to JA were coming in big numbers so for a couple of months I dispensed with the usual small envelope postings in favour of parcel post. The use of special calls by some ZL stations has generated a great deal of interest overseas; hence the increased numbers interested in QSLing their contacts.

Also, on my return home, I found a heap of overseas mail awaiting me at the Post Office. I can only surmise that some countries are still fortunate to have a surface mail service available as some of the parcels had been dispatched in mailbags and I was told that all the parcels turned up over a two-day period; presumably off the same ship. Anyway, these 7000 QSL cards generated quite some activity for the ZL sub-bureaux managers.

Since my last report in the September issue of *Break-In,* I have dispatched 5 kg parcels of QSL Cards to the following sub-bureaux:

- ZL1 (September, October and early November);
- ZL2 (August, September and early November)
- 700g envelopes to ZL3: 3 during September, 2 in October and 1 early November and
- ZL4: 2 during September, 2 in October and 1 early November.

Recently a large parcel (compared with normal) arrived from the S5 Bureau. They have had a good clean out of their pigeon holes! The parcel contained 989 QSL Cards and many around ZL will receive confirmation of QSOs they had fifteen to twenty years ago.

It was good to catch a little of the action in the recent CQWW SSB contest. Sunday evening and Monday were the only times I had available and enjoyed the ten metre openings in the evening and next morning. Beaming towards Asia on ten metres certainly brought in much FM rubbish!

Recently we received an e-mail with a request for assistance. It says in part: "Hi, I have been collecting New Zealand Ham Radio QSL Cards for the past six months: I, myself, do not have a radio I just collect them out of interest and helping to preserve the history of them. I have done a data base on the computer to keep track of what I have … also would you have any idea where I would be able to get other ZL QSL cards from people who do not want them anymore? Thank you, Regards Donna Stenhouse." If you can assist Donna, please e-mail her at <gwstenhouse@xtra.co.nz>.

On behalf of the NZART, I sincerely thank all those members who, from time to time, forwarded a donation towards the Bureau costs with their QSL cards; they were greatly appreciated.

Season's greetings to all who read this column and, of course, the Editor and the *Break-In* team, I wish you all the very best for Christmas and the new year of 2012 on behalf of Dave ZL4OZ, Ross ZL1BGB, Tony ZL2AGY and Ken ZL4HU. With the present cycle improving, may the new year see an ever increasing amount of activity entering into your logbooks and "QSLed via the Bureau"– of course!"

Finally, please remember that if you have any questions, queries (QSL managers' addresses, etc) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or email: <ZL2RR@xtra.co.nz>.

73, *Barry ZL2RR*

Break-In 50 Years Ago

Craig Crawford ZL3TLB

Turning Back the Pages

By E. Malkin

Just after the turn of the century I was serving in one of HM ships of the Home Fleet. During that period I was in a ship's boat that was to convey our Torpedo Lieut. to inspect the Marconi Wireless Station near Poldhu in Cornwall.

Most naval officers who had passed through HMS Vernon, the torpedo and electrical school at Portsmouth, were interested in the possibilities of wireless telegraphy which, at that period, was just making the headlines as being used experimentally in the British Navy.

The Admiralty was equipping vessels in 1889, the first three being HMS Alexandria and two cruisers, the Juno and Europa, which exchanged messages over a distance of 74 miles. Later, in 1900, a contract with Marconi for fitting 26 warships and six coastal stations with W/T apparatus was signed.

After getting ashore at a nearby cove, we went in to search in what remained of the Marconi Station after a gale in September 1901 had wrecked the original installation. This had consisted of 20 masts each of which were joined together in four lengths, reaching 200 feet in height.

All that remained of the antenna systems after the gale were ten masts of 4" x 3" timber bound together in three lengths to a height of 180 feet. The ten masts were set up in an arc of a circle with a triatic stay on top, from which hung the antenna wires, converging at the bottom into a fan shape. The station building itself, which we were not permitted to approach, was powered by an oil engine, judging by the exhaust smell.

From the station at Poldhu were sent the first messages across the Atlantic Ocean in 1901 to a station on Signal Hill at St Johns Bay, Newfoundland, and received on a coherer set by means of a kite antenna of about 500 feet in length.

The coherer receiver was the best of its kind at the time, being replaced later by a carborundum and steel detector, magnetic detectors and several kinds of crystal or mercury combinations, until replaced by the thermionic valve of Professor Fleming in 1905.

A coherer detector can be classified as an imperfect contact detector and does not rectify oscillations. The metal filings in the coherer offer a high resistance to the passage of DC but not to AC until the filings cohere together. This form of detector was very slow in action and could only receive about six to eight words per minute.

One of the important features of this receiving set was the balanced armature relay and any inclination from the vertical position would seriously affect it. In about 1908 one of these coherer receivers came into my possession and I donated it to the Wellington Museum in 1952 as it was believed to be a genuine relic.

Perhaps a short explanation of the working of the coherer set will explain many of the difficulties of the pre-radio set. The receiver was contained in a wooden box about eight inches squared, having a sliding glass front for ease of making adjustments. On each side was connected the antenna terminals which led to the coherer and relay through a small cell. When a signal impulse reached the coherer it caused the filings of metal, contained in a vertical glass to cohere, thereby completing the circuit through the coherer, relay, telephone receiver and the decoherer. The latter was a simple electric bell action, the hammer of which rapped the tube of filings until they separated and broke the circuit. This action restored the coherer ready for the next impulse. (Abridged)

WARO – nz womens amateur radio operators

with Topsy ZL2LS, Sharon ZL2BQ and Ngaire ZL2UJT
<waro@nzart.org.nz>

Greetings to all members and readers of this issue of *Break-In*. This year seems to have gone by so fast and not long now till the big fellow in the red suit comes bearing gifts for one and all. This year New Zealand has suffered a lot but has ended on a high note with winning the Rugby World Cup; this has lifted the spirits of all New Zealanders, so well done the All Blacks.

Articles for *Break-In* have been far and few; we now have a designated email address for the articles to go to but there don't seem to be many coming forth. You must remember that this is your column, and if you cannot provide some information and leave it up to the people doing it, we may lose this, so come on girls, tell us what you or your club has been up to, we all would like to know. The email address for articles for WARO is <waro@nzart.org.net> so please send some information through to us.

The WARO net is still on Monday nights on 3.695 and still remains at 8pm in daylight saving time. The numbers have been varying each week with usually about five to six check-ins but we would really like some more. We know we are all busy but if you remember to check in that would be great.

YLs are also welcome to check in and have a chat with us, there is no requirement to be a WARO member and it would be great to have a few more check in. Over the holiday time some of the net controllers might not be available so if this happens it would be nice for someone to step up and run the net for the night.

We are all looking forward to the big celebrations for WARO next year when we turn 50 so remember 10 March 2012 is our birthday. Margaret ZL1MB (Ph 07 459687) needs to be informed if you are attending the Anniversary Lunch which will cost $35 per person. Hotel accommodation is available at $169.00 per night for two persons, this includes breakfast (please book direct to Hotel 07 3499620).

Special thank you to all the girls who celebrated the Rhododendron Festival Award this year in Taranaki. Hopefully you all have enough points for your certificate.

The President and Executive Committee would like to take this opportunity to wish all WARO members and other readers of this column a very Merry Christmas and best wishes for 2012. Take care travelling if you are and if you are in another district don't forget to call up and chat with the WARO girls in that area, we are sure they would love to hear from you.

Ngaire Jury ZL2UJT,
Topsy Scott ZL2LS,
Sharon Miller ZL2BQ

WARO Profile Reminder

We all know that next March WARO turns 50 years old, and celebrations will be happening in both the North and South Islands with individual clubs or combined clubs.

Please, all members of WARO, can you get your profiles done, if you haven't already done so and send it off to Joline on <jolinebeale@paradise.net.nz>.

This is an important milestone for WARO and we would like to have documentation of all WARO members at the time of the 50th celebrations, and if you haven't done your profile we cannot do this properly.

These profiles will then be put into a book of some form for future reference to us all. This is your club so get behind this and support those who want to make this celebration a success.

For those who have done your profile thank you very much and for those who haven't please can we ask you to do it and get it away to Joline before the end of December this year.

Many thanks to you all,

Topsy Scott ZL2LS

Nelson Girls Auction Night

Branch 26 President ZL2PO Paul asked us girls if we would like to do a programme for one of the club meetings; well us being us, said "Yeah not a problem, us girls can do anything." Well then we had to think of something to do as our month September was coming up fast, but we put our thinking hats on and ZL2LS came up with the idea of having a fun night of some sort and make it a fund raiser for the club. "Yeah that sounds like a good idea but what do we do?" Well we had a brown paper bag auction. You may ask what on earth is that, well let me explain.

Nelson Girls Auction Night. Sharon ZL2BQ (left) and Topsy ZL2LS into the bidding.

You get all your prizes together, either donated or purchased and number them and put a corresponding number into an unmarked brown paper bag and then seal it up. That is all you have to do and then no one knows what is in the bag. You then start your auction and get the money coming in honey.

We managed to get all our prizes donated, by most of the girls and by some of the guys from the club also. We had 33 items up for auction, and all bags were auctioned off. Our prizes consisted of books, wine, soldering iron and solder, chocolates, car cleaning products, petrol vouchers, power extension cords, bungee cords, wooden puzzles, plus several others and of course the booby prize, you have to have one of them.

Both Sharon ZL2BQ and myself ZL2LS got up the front and started the bidding, it was slow to start with until the lads got into the swing of it, and with us hounding them, and if they hadn't bid they were hit on next. Then we got into the swing of it and had a great night. We had lots of laughs and got the moths out of the pockets.

Once all the bags had gone, we asked each person who had purchased a bag to come up and pay for it and then they would have to show everyone what they had got, that was the best as some people had been up and seen the prizes and wanted certain things but they did not know what bag they would be in so bid on several and still didn't get what they wanted, it was hilarious. The auction itself lasted about an hour or so, then we put on a nice supper, for which they had to pay a gold coin donation which also went back to the club funds. The supper went down a treat and just finished a great evening off.

From the auction we managed to raise $372.80; yes, it got down to the cents in the final bidding war, and from the supper we got $40.00 so a grand total of $412.80 was raised for the Club. That is really good going and like I said before everyone had a great time and good comments were made over the local repeater the next day and those that didn't go wished they had. We have been asked to do it again next year so they must have enjoyed it.

I would like to thank all the girls for their help with donating prizes and helping on the night. Those that were at the auction and helped were; Topsy ZL2LS, Sharon ZL2BQ, Heather ZL2TYF, Peggy ZL2PP, Judy ZL2OBE, Fay ZL2FAY, June ZL4MUF and our newest NAG Peta ZL2TPC.

I would also like to thank the Nelson Branch for getting in and supporting us girls, as if you hadn't turned up it would not have been the success it was, must have been the temptation of the supper to follow do you think.

If anyone would like info on how to do this as a club fundraiser please get in touch with me and I will explain how it works but it is very simple but a great fundraiser for the clubs and a great night for everyone.

Cheers, *Topsy Scott ZL2LS*

Budding Hams

At last our grand kids are showing an interest in electronics. Our Grandson, Jai (14), has made quite a few projects at high school but unfortunately can't carry on this year as the electronics class is only for one term.

We have made some projects together and are in the process of constructing a stereo amplifier kit set which has been really fun. Granddaughter, Antonia (5), came along to watch and decided she was keen to help. She was a great help, holding the solder wire for me and trimming the ends of the capacitors. I really hope we can nurture this interest as it would be great to have another Ham in the family.

Ngaire ZL2UJT

Wishing everyone in WARO a very Happy Christmas and our best wishes for 2012.

Our girls here are all looking forward to catching up with everyone who is coming over to the International Meet. Many of us are also coming over to join with you all to celebrate the 50th Anniversary of WARO at Rotorua. It will be great to catch up with all our friends again.

Dot VK2DB ALARA
Editor

Nelson Branch 26 link

By Sharon ZL2BQ

Nelson Branch 26 has been working on a link. This allows people who have high noise levels on HF at home to be able to listen on the link which is set up remotely.

They can transmit on their own rigs and listen to the link which has been set up in a spot which has a very low noise level. It will also be great for those who do not have HF sets to be able to listen in on their UHF radio. I can see so many benefits for it going forward as people in rest homes will still be able to listen in to their old buddies and be kept in the loop with whatever is going on. Also I think it will work well for a lot of our local Nelson ladies. Hopefully by them listening to the WARO net on their UHF radio, it might get them keen to be able to set up an HF station sometime.

When the link was first set up it had only eight different frequencies in it but just recently they have made modifications on it to allow us to be able to dial up any frequency we want. It's all very clever.

Before I became a Ham I thought it was just for the oldies but I have been proved so wrong. We have a very clever group of people in our club who are great to learn from and help us all to grow the hobby.

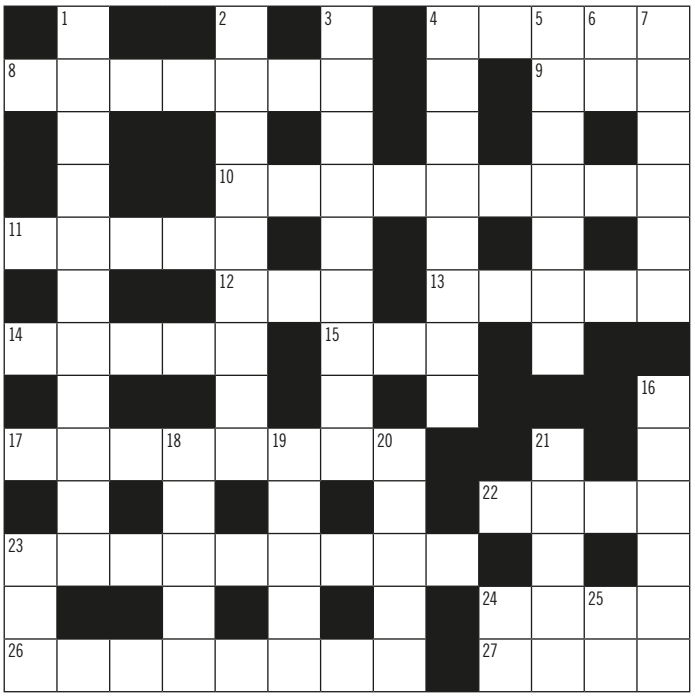
I have only been a Ham for three years and I am amazed how much new and improved technology can be mixed with the old technology. It really is a hobby that has so much going on and new stuff keeps coming along.

Sharon ZL2BQ

"Budding Ham" Jai and Grandma ZL2UJT working on our amplifier project.

ZL Crossword 14

Compiled by Graeme Hunt ZL1ANH



Across;

4. Rescues (5)
8 and 2 down. Z2BL who took up space at Ernest Rutherford's school (7, 9)
9. Naturally occurring mineral (3)
10. Thousands of joules per second (9)
11. Dig with this connector type (5)
12. Use to tune slightly off transmit frequency, abbrev (3)
13. Not a meat eater (5)
14. Lots of spiny succulents in XE (5)
15. Rural transport, dogs on the back (3)
17. Took the faults out of prototype electronic equipment or software (8)
22. Join more than one variable tuning capacitor or variable potentiometer so all move at once (4)
23. Theoretical antenna used as a comparison (9)
24. Abalone Maori (4)
26. Not in series (8)
27. Port in Yemen (4)

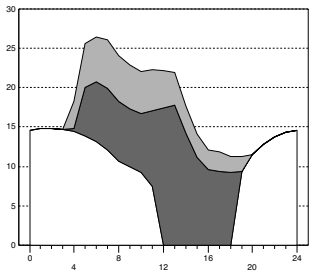
Down;

1. They receive, temporarily store and then retransmit packet radio transmissions (11)
2. See 8 across
3. To do with size and found on the broadcast band (9)
4. Local propagation without the ionosphere (8)
5. Current times resistance (7)
6. Doubtful in Chisinau prefix (2)
7. Spice up a meal and a time of the year (6)
16. New Zealand coastal town named after the British Commander in the Crimean War (6)
18. Above very (5)
19. Some angry animals and icebergs do this (5)
20. Makes a hole, plants a seed and a hard wearing cloth (5)
21. One huge lot of capacity (5)
23. Buy your broadband off one of these abbrev (3)
24. Your Dutch assistant prefix (2)
25. Pass this to go to tertiary education up to 1985, initials (2)

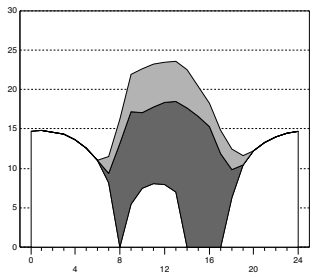
Answers on p39

Ionospheric Predictions

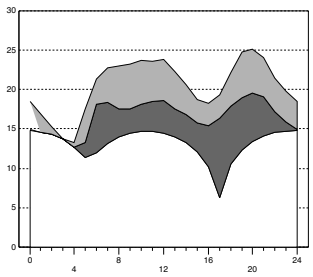
JANUARY / FEBRUARY 2012 **T-index = 75**



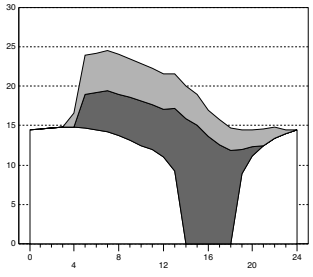
WN-
Moscow
(SP)
16548 km
312°



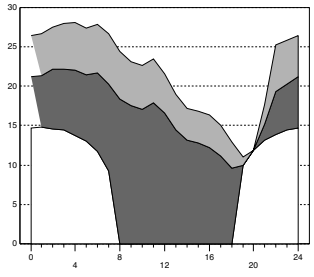
WN-
London
(SP)
18814 km
343°



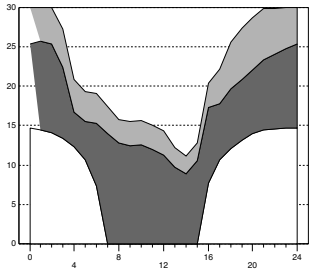
WN-
Jo'burg
(LP)
28265 km
31°



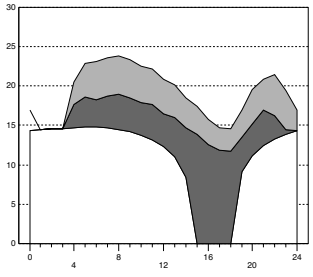
WN-
Istanbul
(SP)
17168 km
281°



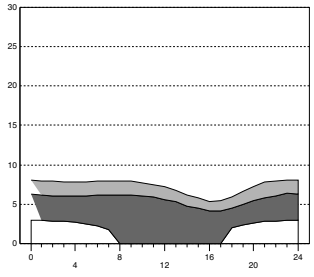
WN-
Tokyo
9274 km
332°



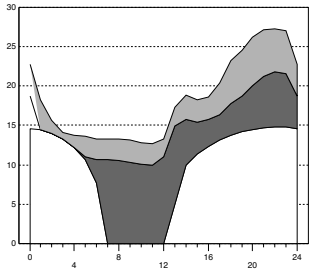
WN-
San
Francisco
10859 km
45°



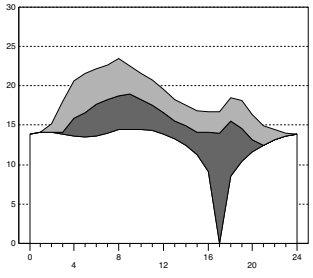
WN-
Cairo
16519 km
261°



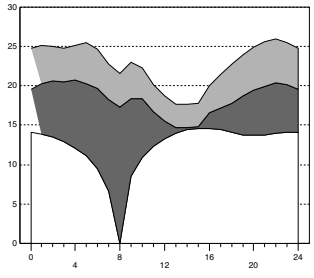
WN-
New
Zealand
300 km



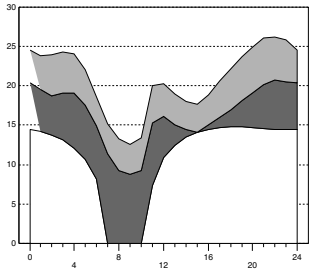
WN-
New
York
14402 km
66°



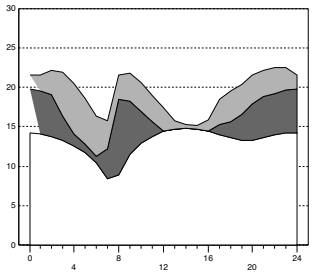
WN-
Jo'burg
(SP)
11759 km
211°



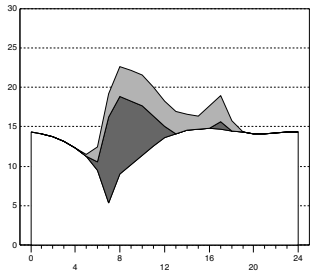
WN-
Rio de
Janeiro
11780 km
144°



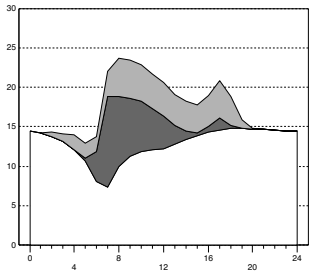
WN-
Barbados
13962 km
104°



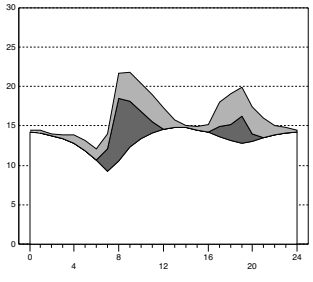
WN-
Dakar
16862 km
155°



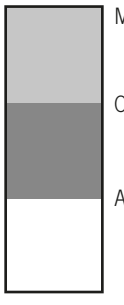
WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°



Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

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Past issues of *Break-In*

Indexes for past volumes of *Break-In* from 1947 to the present are available on the NZART website; <http://www.nzart.org.nz/nzart/nzart/Breakin/index/bi-index.htm>

Answers (Crossword on p37)

Across: (4) saves, (8) William, (9) ore, (10) kilowatts, (11) spade, (12) RIT, (13) vegan, (14) cacti, (15) ute, (17) debugged, (22) gang, (23) isotropic, (24) paua, (26) parallel, (27) Aden.

Down: (1) digipeaters, (2) Pickering, (3) amplitude, (4) skywaves, (5) voltage, (6) ER, (7) season, (15) Raglan, (18) ultra, (19) growl, (20) drill, (21) Farad, (23) ISP, (24) PA (25) UE.

NEWS FLASH!

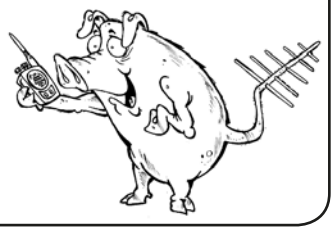
NZART CONFERENCE 2012 IN SUNNY NELSON

Queen's Birthday weekend (1-4 June 2012)

Tahuna Beach Conference Centre, Nelson

Onsite accommodation at Tahuna Beach Holiday Park

Freephone 0800 500-501



HAMADS

WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Phone (09) 575-6940 or e-mail <paul.ssegrub01@gmail.com>.

WANTED: Packet TNC Kantronics KAM or KPC-3. Later or older versions considered, please turn out your junk box! Paul ZL4AX. Phone 021-158-2521 or e-mail <zl4ax@yahoo.co.nz>.

WANTED: FT-790RII All Mode 70cm transceiver complete or just the 25w linear amplifier (FL7025) for the above. Kevin ZL3DAC. Phone (03) 789-9875.

WANTED: Icom 251A type microphone (7 pins and 1 at centre) or similar model considered. ZL1CUC. Phone (09) 416-7454 or e-mail <dublin@ihug.co.nz> or *CallBook* address.

FOR SALE: Icom IC-745 Transceiver / General Receiver. Unused for ten years, will require overhaul. Offers close two weeks after *Break-In*. Contact ZL1MD. Phone (07) 346-3411 or *CallBook* address.

FOR SALE: KVG 9MHz Crystal Filter with carrier crystals. ZL1ABL. E-mail <zl1abl@infogen.net.nz> or *CallBook* address.

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

"DX" WITHOUT "TX"

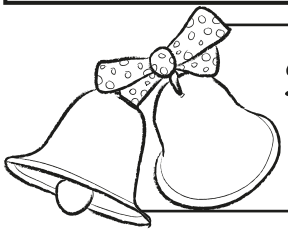
For over 60 years, the NZRDXL has catered for the interests of DX listeners in New Zealand.

From Radio Bangui in the steamy jungles of Africa, to the haunting Andean music of Radio Huancayo, to the ever-accurate news from BBC, radio still delivers an important message.

And our monthly magazine The DX Times will tell you what's on the bands and where and when to find your DX-targets.

Whether you're a die-hard DXer, a news junkie, a stickie-beaker, or looking for an alternative to TV and the internet, you'll find people with common interests in the NZRDXL. All for as little as $20 per year.

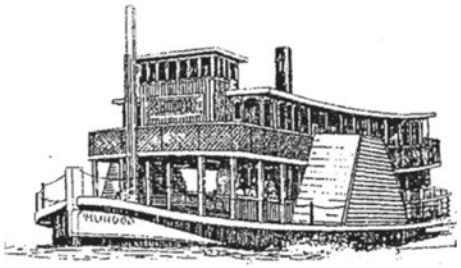
For more information please visit www.radiodx.com where you can download a sample DX Times or request an info-pack from:
NZRDXL, PO Box 39-956, Howick, Manukau



Seasons Greetings from the team at NZART

WIA Annual Conference

Mildura, 25-27 May, 2012



ZLs are welcome at the WIA Conference.
If you are thinking of a break in Australia, why not include the WIA Annual Conference?

If you include Mildura at the end of your break, you can go straight to the NZART Conference in Nelson.

Register online at **http://www.wia.org.au/**

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